In This Issue—*Making Dealers in North Dakota*

MOTOR AGE

Vol. XL
Number 2

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JULY 14, 1921

Thirty-five Cents a Copy
Three Dollars a Year

Entered as second class matter Sept. 19, 1899, at the post office at Chicago, Ill., under Act of March 6, 1879.

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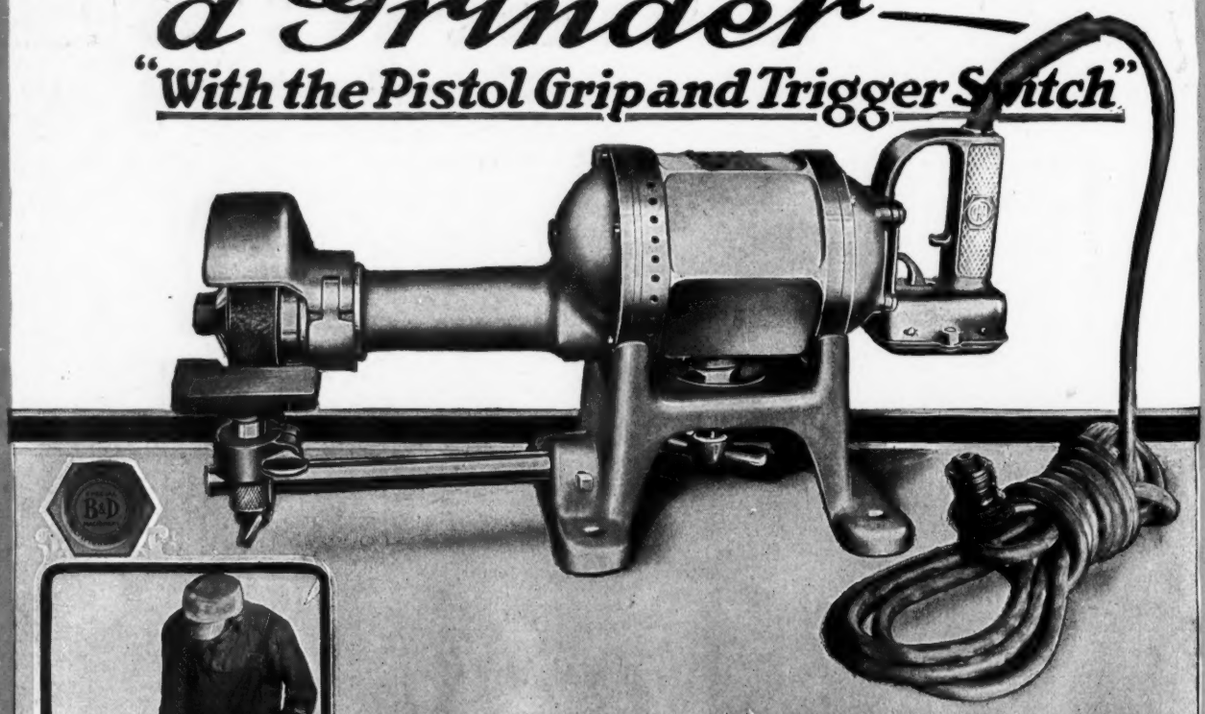

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MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

HORACE M. SWETLAND, *Pres.* W. I. RALPH, *Vice-Pres.*
E. M. COREY, *Treas.* A. B. SWETLAND, *Gen. Mgr.*

Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

XL July 14, 1921 No. 2

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MALLERS BUILDING
CHICAGO

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SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions	$ 3.00 per year
Canada	5.00 per year
All Other Countries in Postal Union	6.00 per year
Single Copies	35 cents

Make Checks Payable to Motor Age

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 239 W. 39th St., New York, H. M. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; A. C. Pearson, Treas.; Fritz J. Frank, Sec.

VOL. XL No. 2 CHICAGO, JULY 14, 1921 $3.00 Per Year

MOTOR AGE

Making Dealers In North Dakota

They Have Learned How to Live and Carry on Their Business Under the Hardest School of Training—Necessity. They Have Come Through It and Are All Set for the Future

By David Beecroft

THE last week in June the twenty-six national manufacturers of farm tractors staged a three-day demonstration of plowing and seeding at Fargo, N. D., ostensibly to stimulate tractor sales, which this year have hovered unmercifully near the zero mark in this territory. Scarcely 1,000 farmers attended the demonstration on the second or best attendance day.

There is no section in the west that needs tractors more than the Red River Valley, a strip of heavy gumbo soil 30 to 60 miles wide stretching north and south across the eastern end of the state—but the farmers did not come.

To make the demonstration doubly attractive the tractor makers staged a competition between horses and tractors and staked $1,000 in cash prizes—but still the North Dakota farmers stayed at home. The demonstration was a signal failure from the viewpoint of farmer attendance and tractor sales.

Nothing could better exemplify the temper of the North Dakota farmer than his attitude towards this tractor demonstration. He is sore at things in general, and high prices of farm machinery in particular. He would not burn gasoline and wear tires to motor to Fargo to witness forty tractors and eleven horse outfits demonstrate. He would not spend money for railroad fare for he had little of it to spend.

He is not buying tractors. He is buying very few cars. He is doing very much of his own car repairing. He is running his motor car without an extra tire and often has put one casing over another in order to get through until August 1, when he will know what his crop will be and whether he can run his car or not.

The North Dakota farmer has gnashed his teeth against the world in general and high-priced machinery in particular.

LAST fall his friends in the Non-Partisan League urged him not to sell wheat when he could have gotten $2 or more per bushel and now he is selling at $1.25 or $1.40. Eggs are the cheapest the state has ever known. He cannot sell horses—oats are cheap—everything on the farmer's side is at rock bottom and everything he has to buy is high. He has contributed perhaps $100 to the United Consumers Stores, a Non-Partisan League activity.

He has contributed to the support of the fifty or more weekly papers which the Non-Partisan League has and which are going into receivership nearly every week, three having gone last week. Perhaps he has paid $8.00 for himself and each of his sons as League membership. Perhaps he has money in some of the fifty banks that closed some months ago and are still closed but many of which may open. Perhaps he has had money in some of the co-operative packing concerns that are now closed because of poor management.

Worst of all, he may have his farm in the worst part of the state "west of the Missouri" as they describe it, where there has not been a good crop since 1916 and where all are hoping and praying for rain and cool weather so as not to spoil the good prospects for a crop this year.

No wonder this North Dakota farmer is not even buying Fords; no wonder that some of them have not had their tractors out of the sheds this year; no wonder that some have not paid their garage repair bills since last July; no wonder they are sore when they cannot buy new tires on time, or cannot charge their repair bill, or gasoline bills.

Such a territory should not be a particularly congenial place for a motor dealer or garageman, and yet you find across the 350 miles of North Dakota, garagemen and dealers in every town of 500 or over who are still in business, still happy, still hopeful, still stout believers in the stability of North Dakota, and best of all, still confident in the industry.

Most of these dealers have the spirit that wins. Some in the western part of the state have come through a literal baptism of fire in the last five years and they are emerging stronger and bigger because of their experience.

Do not get the impression that all of North

North Dakota Dealers Set for Future

DAVID BEECROFT, directing editor of The Class Journal Company, recently spent a week in the State of North Dakota making an analysis of economic and business conditions, particularly as they affect the automotive dealer. He covered practically the whole state, visiting dealers in such towns as Fargo, Grand Forks, Minot, Devils Lake and others.

The article herewith tells of Mr. Beecroft's findings, which, it is felt, will be read with much interest by the trade in general, inasmuch as many have held that the North Dakota dealers are in a sorry plight.

Dakota has had crop failures since 1916; only the west end, from Minot two-thirds across the state to the Montana line, and from north to south 200 miles. The central part of the state has had fair crops and the eastern end with such cities as Fargo and Grand Forks has not had a crop failure in years.

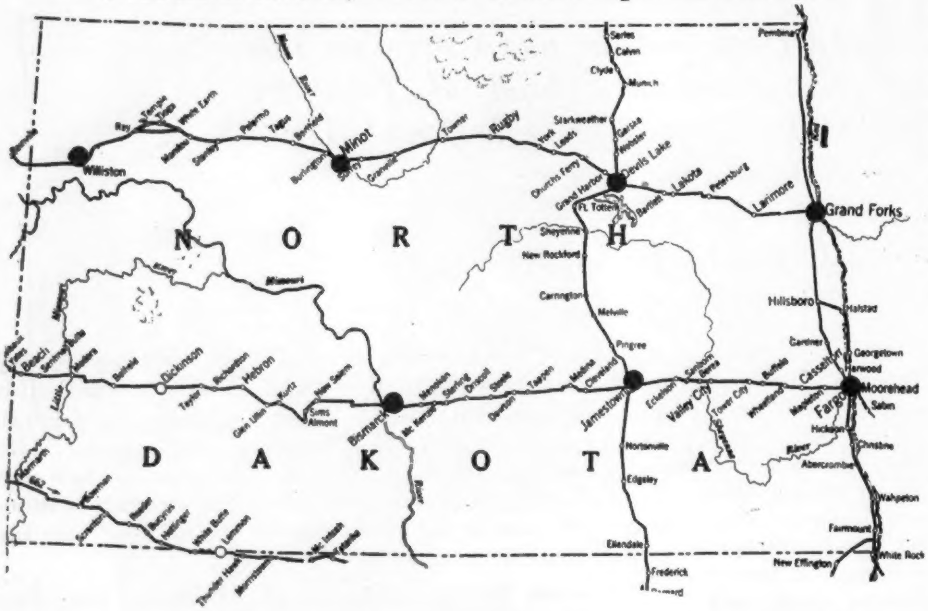
The North Dakota dealer has come through a fiery furnace. Thanks to the Non-Partisan League, financing companies that help owners to buy cars in other states, have with the exception of one or two withdrawn from operation in the state. The General Motors Acceptance Corporation withdrew a year ago leaving General Motors dealers to shift for themselves. Most of the distributors handle their own paper.

The banks positively refuse to aid any one in purchasing a motor car. There are five or six cities such as Fargo, population 22,000; Grand Forks, 15,000; Minot, 8,000; Bismark, 6,000; Devils Lake, 5,000; Jamestion, 5,000, in which the banks have money and might aid the dealer to carry on time sales but they stoutly refuse. In the smaller towns and villages the local banks have not money and could not aid even if the spirit were willing.

Consider an example of a banker's attitude in Grand Forks. A dealer had a farm prospect who wanted a $1900 car and was ready to give his notes in part payment. This farmer had 320 acres of land worth $40 per acre, and no mortgage against it. In addition he had $32,000 of his own savings loaned in mortgages and notes; yet his banker refused to carry his notes on this $1900 car. The car dealer now has the notes in his own vault and the farmer has the car.

That is the way cars are sold to farmers in North Dakota when they are sold. The dealer must finance the deal himself. The bankers of North Dakota in the larger cities have and still are trying to do all they can to stop sales of motor vehicles made on a time basis. They admit the motor car is a necessity, they could not do otherwise, but they advise the farmer to repair his old car or do without, or lay his old car up until the crop is assured. They have the same policy for tractors, trucks, and agricultural machinery.

North Dakota, Home of Intrepid Dealers



This map shows the regions and towns visited by Mr. Beecroft in making his analysis

From June 20 to July 30 is a period of coma in North Dakota business. This is the month of crop making or breaking. Business literally stops during this period. The farmer will not buy anything. The banker will not lend. The business man waits. By July 20 we will know whether or not there is a crop. We are never certain until then. More crops are ruined in North Dakota in early July than any other time.

Once July 20 is passed and the banker knows what the crop is, he is a new man. He is in a position to make loans. He has a definite line on the business for the next twelve months. The motor car dealer has a knowledge of what he can sell. The farmer has laid his plans. The biggest banker in North Dakota said last week he would discourage a farmer buying anything until the crop for this year is definitely known. He would handle no notes on tractors, trucks, cars, farm machinery or anything else going to the farmer. After July 20 he may make loans if crop prospects are good, and he will not make loans if crops are poor and the farmer has to be financed for another year.

But in spite of all this the North Dakota dealer has carried on. Mortality in his ranks has been amazingly low. Very few sub-dealers have closed shops. The distributors are nearly all in business. The distributor in Fargo, Grand Forks, Devils Lake and Minot, tells you his sales are all in the city, none in the country, and yet his country dealers have not gone out of business.

They all have repair shops and garages. They sell gasoline, oil, tires, and the necessary repairs and accessories. They have reduced overhead to the minimum. They repair tractors, isolated electric lighting plants, trucks, cars—in short, everything that has to be repaired—but they do not sell cars.

Many of them have withdrawn their deposits with the distributors and technically may not be dealers in any particular make of car, but they still have their place of business and are operating. They are ready to go when business revives and the farmer comes back. W. A. McMillan, Buick distributor in Fargo, cites the case of a dealer in Lisbon, a town of 2,000 population, who has not yet taken a 1921 demonstrator but he is still in business and is healthy and hopeful.

D. Welch, manager of the Dodge Minot agency, has fifty-eight dealers and they have garages and repairshops, although this year only two Dodge cars have been sold in the territory.

The Overland distributor at Grand Forks in the eastern end of the state has 100 dealers all of whom are in business, but are selling scarcely one-twelfth the cars sold in this district a year ago.

E. J. Siverson, Studebaker distributor in Grand Forks, with forty-five dealers, reports them all in business although practically all Studebaker sales are in Grand Forks. Mr. Hurst, manager of the Nash agency, with fourteen dealers, has only three that have left up deposits but they are all still in business. Dealers in Devils Lake tell the same story of no country sales and only city business. Overland sales in city and country are as 13 to 1. C. D. Haley, Studebaker dealer for 11 years has only city sales but a good country dealers' organization.

PROSPECTS ARE VERY GOOD THIS YEAR

There is not one of these country dealers that could not sell motor cars if farmer's notes could be handled. The spirit to buy is as strong as ever, but finances are weak.

Motor car dealers in cities, towns and villages of western North Dakota have learned how to live and carry on under the hardest school of training—necessity. They have been thoroughly tested and tried. They have nothing to worry about. The prospects this year are good. They have learned how to do business without the assistance of banks. There has been no inflation of land values in North Dakota and consequently no deflation to pass through. The business men say they are better off than Iowa and other states that have had tempestuous rises in land values and big deflation problems.

North Dakota has been denied credits for several years, which fact has held inflation back. In the western part of the state where there has not been a crop since 1916, there has been no war profits—nor the evils that have followed in their wake. There dealers are all set for the future. They have gone through it all. They know how to convert part of their sales building into a garage and carry the overhead charges. They know how to handle two or three tire accounts and make dollars that way. Some of them have sold tractors and know what money can be made from farm machinery. They have practically gone on a cash basis for repairs and have learned how to say no when credits on parts or repairs are asked for. They had to finance themselves and did not stock up on used cars. The banks gave no aid so they ran the show themselves. Had banks given them liberal credits, they might find themselves stocked with used cars, or with too big buildings on their

hands, or suffering in other ways from over expansion. The credit to make such misfortunes possible was denied them and they are better for it.

The strenuous character of the times is working a change for the better in many ways. Tire companies that attempted to maintain branches in some cities of 5,000 population, have closed them and placed the agency with a dealer or a tire vulcanizing shop. This is becoming general. Some car dealers handle two or three lines of tires.

There was not business to warrant a tire branch organization, and now that those same tire companies are giving discounts as high as 25 or 28 per cent, the car dealer sees prospects of making money on a tire account, particularly if he is a good merchant and turns his tire stock over six times a year, as he should. The tire companies will maintain warehouse stocks in different centers, but even the number of these can be kept low.

In western North Dakota a dealer does not say he cannot handle different lines of cars, trucks, tires, tractors, isolated house lighting sets. They have learned how to do it and conduct a garage and repairshop besides. Necessity is ever the mother of invention. She is veritably the sire of the automotive dealer. No dealer throughout North Dakota or Montana has much of a tire stock on hand. Dealers buy in small quantities. At present mail order houses such as Sears-Roebuck and Montgomery, Ward & Co. are doing considerable tire business and their lines are cheaper than standard makes. The farmer knows this but he is short of cash and is content to buy a cheaper article to tide him over until the crop comes in. Once the crop is in leading tire concerns are looking for a big tire business in this area.

There is not a car in the territory but is wearing out its old tires and running short of spares and tubes. Money may be short and there may be none for new cars but all cars are in use. In one or two places you get rumors of some few cars jacked up in garages. These are often cases where tires are worn out and there is no money to buy new ones and cars are laid on the shelf. The use of cord tires, even on Fords, has greatly increased in towns and villages.

NORTH DAKOTA AMONG OLDEST TRACTOR STATES

North Dakota is one of the oldest tractor states west of the Mississippi. The 77,000 farms in the state have an average acreage of 466. Few farms are smaller than one-half section, 420 acres and that is a good size for a two or three-plow tractor. The land is generally level and the soil heavy.

Summer fallowing for wheat should be done in July and August, when the temperature is too high and soil too hard for horses, which fact has caused the sales of many tractors. Tractor sales this year have been virtually nil, whereas last year they were good. In Devils Lake area Mr. McCullough, of the State Auto Co., Ford dealer, has not sold a Fordson this year but sold several last year, and if crops are good expects to make several sales this fall.

C. D. Haley Studebaker dealer, handling I. H. C. tractor, has sold one this year. In Minot scarcely a dozen tractors of all makes have been sold this year. The same is true of Grand Forks and Fargo.

In parts of the state, many tractors are not being used for lack of money to buy gasoline or kerosene. Most of the two- and three-plow tractors are in use, but one dealer found only one out of twenty-four machines of his make in use in a part of his territory investigated. These machines were generally more than three-plow capacity.

The farmer's psychology is not using the tractor is that he has his horses and they have to be fed. Hay and oats are cheap. He has no money to spend for fuel, oil or repairs.

In North Dakota the farmer bought a tractor to take care of the peak load on the farm, and last winter being unusually mild, he was able to do much more fall plowing with horses than formerly, so that the acute spring peak did not materialize. Still the farmer realizes the value of the tractor; as one said, previous to buying his tractor he was able to get all his fall plowing done, but the first year he had a tractor he fall-plowed some of the land twice and the increased yield of crop the first year was worth one-half of what the tractor cost.

Many of the farmers have yet to be sold to the value of the tractor, as have nearly all of the bankers. Unfortunately, the banker fails to realize the economic value of the tractor. He fails to realize that its greatest value is in making it possible for the farmer to plow when plowing does most good and to plow deeper, thus increasing his yield per acre. The banker today is too frequently opposed to the tractor. He sees it only as a substitute for the horse. He urges the farmer to use the horse.

Repair business in North Dakota is good. Every car is being repaired and the farmers are doing more repair work than they ever did before. Sales of spare parts are normal and mostly on a cash basis. At one Ford agency a farmer came in and wanted a new car on time. The dealer would not sell him but sold him spares for his old car. The frankness with which dealers refuse sales in which credits figure, is encouraging. It is stimulating. It shows the good that comes out of depression and crop failures.

Garages generally carry reduced stocks of parts and as one man put it, "We carry only necessities." They have learned which accessories are needed and which are not. Brake linings, spark plugs, piston rings, springs, oils, greases, wrenches, tires tubes bulbs are considered necessities. The accessory stocks are generally liquid. The shelves are not groaning under a load. Purchases from jobbers are in small lots. Sales are for cash except where accounts have been carried for years and where payment is made in 30 days or not over 60 days. There are repair shops that have been carrying farmers since last July; but they have gotten tired carrying such a load and are finding that the average farmer has some cash which he has not deposited in the bank.

FARMERS REALIZE TRUCK HAS BECOME A REAL NECESSITY

Truck sales in North Dakota are largely in the four or five cities, with a few in the country. Ford and Dodge jobs are finding their way to the farmers and the Nash dealer in Grand Forks recently sold a truck to a potato farmer living nine miles out. Farmers are coming to realize that when they live ten or more miles from the railroad depot, the truck becomes a real necessity.

George Dixon, Reo dealer in Grand Forks, looks for good truck prospects this fall. W. A. McMillan, manager of Pence Co., Buick distributor in Fargo, has sold but six trucks since Jan. 1, and not one in the last six weeks.

Many of the North Dakota roads are black gumbo, the main routes being well graded and dragged. In dry weather the surface is good, but in wet weather impassable.

The motor truck appeals to the North Dakota farmer due to the short season he has in which to do his work. His condition is very different from that in Texas and Kansas, where the farmer has long seasons. In North Dakota the country freezes up in October and by that time he must have his fall plowing and threshing done, and his grain delivered to market. He has a veritable peak period and the tractor and truck will

(Concluded on page 25)

An Analysis of North Dakota

THE North Dakota dealer has carried on in spite of the baptism of fire through which he has passed the last few years. Very few sub-dealers have closed shop. Nearly all the distributers are in business.

In Fargo, Grand Forks or Minot the distributor will tell you his sales are all in the city, none in the country, and yet the country dealers have not gone out of business. What do they do? They all have repair shops and garages. They sell gasoline, oil, tires and the necessary repairs and accessories. They have cut overhead to bed rock. They repair tractors, cars, trucks, isolated light plants—in fact, everything that is to be repaired—but they do not sell cars.

Motor car dealers in Western North Dakota have learned how to live and carry on under the hardest school of training—necessity. They have come through it all and are set for the future.

In Your Advertising

Sell Your Own Organization

Average Automobile Advertisement of Today Lacks Logical Sales Foundation

AUTOMOBILE advertising needs a radical revision. This is the opinion of some of the biggest automobile distributors of the west as expressed recently at a gathering attended by men who sell most of the cars on the coast.

In their opinion the average automobile advertisement of today lacks logical sales foundation and the time has come for the dealers to begin concentrating their advertising campaigns on the biggest thing they have to sell: namely, their own organizations and not the factory names.

They state there was a time when the problem of the industry as a whole was to create the desire to own a car in a large number of people—to establish this desire generally.

Too much of today's printed salesmanship still follows that same general trend, and the money the dealer contributes to the funds so spent, continues to add to the bulwarks of the factory's position but does not materially strengthen the position of the dealer.

Automobile advertising in a sense represents the natural result of a condition that the dealers themselves are much to blame for—though they could not, as a matter of fact, help themselves.

When the big automobile agencies were established, the advertising policy was not always one of the first problems considered. Unless the factory took a very active hand in defining the local as well as the national policy, the chances were that the line would be advertised without any specific plan of attack.

ADVERTISING A FACTORY FUNCTION

It therefore became an established policy with the lines to include specified appropriations for advertising and in some cases to make the advertising in the local field an exclusive factory function.

While the factory may have had the best intentions at heart, it was natural for it to see to it that its own local investment in good will and prestige became as much a factory property as it did a dealer property. The dealer has at times felt that the average campaign had too much in it for the factory and not enough for the upbuilding of local institution, inasmuch as the dealer carries the heavy load of making the name for any car in the community.

Dealers believe that the automobile represents transportation service as much as anything else, and that this is not exclusively something inbuilt in the vehicle, for transportation service implies a great many things and, first of all, a good strong local organization that can fairly represent the car. **A good car with poor local representation gets nowhere any more than a good dealer organization can build permanent position on a poor car.**

The effort will therefore be made by western dealers to bring more and more of their advertising salesmanship to bear on the transportation service organization which they are able to offer the motoring public through the purchase of the cars they represent.

The campaigns in the future will be aimed at the strengthening of the dealer positions in their territory, and will thus make them more independent of changing factory conditions.

This plan should in the end work out better for both the manufacturer and the dealer, provided the dealer accepts his responsibility and gives to his printed salesmanship the same thought that he does to his sales force. It is certain that much factory copy has been accepted in the past for no better reason than that the dealer was too lazy to get in and do it himself.

Attractive mats and copy went to the papers. It is very easy for the automobile advertising salesman to take an attractive ad, slip into the office at the last minute, get the dealer's O. K. on something he doesn't take time to read, and shove it in for Sunday copy. The lack of intelligent interest in advertising on the part of the manager of a Sunday automobile section is one of the greatest organization failings.

INSTITUTIONAL ADVERTISING PAYS

Not long ago one of the biggest distributors in California startled some of the motor car fraternity when his advertising appeared in eastern magazines of national circulation. Certainly this was not factory prepared copy. **It was institutional advertising of the highest sort and established in the minds of any who might be coming to California, the fact that this dealer represented a certain make of car, and more than that, that his was a business of motor car transportation service, bringing to the owner of the cars which he represented the backing of an agency that stood for something.**

The reputation of the cars which he handles has helped to establish his position in the west—for millions have been spent in advertising them, but his own advertising establishes the position of that car in his territory more clearly than factory campaigns could ever do.

It is said of a big northwest dealer,

Institutional Advertising Pays

NOT long ago one of the largest distributers in California startled some of the automobile men when his advertising appeared in eastern magazines of national circulation. Certainly this was not factory prepared copy.

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that he can put over any car he wishes to take hold of. It is true that he has taken on a tire line and in remarkably short time made one of the biggest successes in the north Pacific states of it. He has had many lines and dropped many. Certain of his lines have been with him for ten years. Not one of them could have built the wonderful organization in several states which this man has. **For years he has sold only one thing—his institution.**

True, the lines which he selected helped build his institution, but the prestige of his own organization in turn made them. This man has never deviated from the policy of building his sales organization as a unit in motor transportation service, of which the car agencies were parts.

The result is that no cars are better thought of than those lines which he has handled for years, and the policy has become so attractive to manufacturers that there is rarely a line seeking a dealer in the northwest that does not offer its agency to this organization.

ADVERTISING STRESS ON CAR'S MAKE

In the opinion of this man, the average factory campaign of today misses half its opportunity. It does only half the work it should do. Western dealers are laying plans for the future where every dollar expended in their advertising fund will build continually to that local factor in motor transportation service which they themselves represent.

The criticism of the average campaign is that it has for its object the creation of the desire to own a car, and not the particular car which this dealer has to sell. If the factory cannot stress the advantages of owning its particular make, the dealer proposes to do it through his own sales organization, as represented by the combination of his advertising and sales departments. To that end he wants the co-operation of the factory in building up the local organization offering the distributing facilities for the factory, just as he has in the past, cooperated with the factory, expending his effort and money in building up the car prestige and the car owning desire, when the big effort in the market lay in that direction.

Speeding Up Bearing Work By Use of Compound

RECENT years have seen the placing on the market of products and devices intended to speed up certain common operations of automotive repairshops, without in any way sacrificing the quality of the work. In fact, some of these products actually make it possible to do a better job in less time than can be done by adhering to orthodox methods.

Of all the maintenance work on engines, that of fitting connecting and main bearings on engines probably is the most difficult. The old methods of hand scraping and lapping are largely a thing of the past, because in this day and age shop methods are characterized by speed.

It is important that bearings in the engine of a motor truck be put in shape over night, because the truck must be on the job in the morning. Likewise the car owner wants his motor transportation interrupted as little as possible. When he leaves his car in the shop he wants to know just how soon it will be ready. Take the case of the farmer using a tractor. During the busy season he cannot afford to be without the use of his tractor for more than a day at most. Whatever service work is necessary must be done rapidly.

With some of these thoughts in mind we are lead to the product known as Timesaver, a compound to be used in connection with bearing work. Those who have used it state that a 90 per cent bearing can be secured with it in about one-fourth the time ordinarily required by hand scraping. The compound is soluble in oil and it can be removed with gasoline after the lapping operation is finished. It cannot be used in grinding valves, lapping in pistons, etc., inasmuch as it does not work on iron or steel.

Timesaver is composed of large and small crystals. The former make up the cutting substance and the latter a neutralizing substance. The action is this: when the large crystals have been worn down so that the short crystals are in contact with the rubbing surface, these are broken up and, due to the neutralizing action, destroy the cutting qualities of the compound. As a rule, this action requires about 10 minutes.

In fitting a connecting rod bearing the rod is clamped in place on the shaft and rocked back and forth after the bearing compound has been applied

It is not necessary here to state the manner in which bearings are hand scraped, inasmuch as the process is familiar to most shopmen. It will be of interest to them to know the method of using Timesaver, although this product has been on the market for some time and has been successfully used by many shops. The bearings are bored or cast to a light driving fit on the shaft and ground in with the compound. The latter is applied very thinly and with plenty of oil. It is ground or lapped with a twisting and turning motion. After a few such twists the shaft is cleaned and fresh compound applied.

It is especially easy to fit a set of rods with this compound. This can be done by removing the caps and taking out one shim, applying the compound, reassembling the cap snugly, but not too tight, and rotating the rod, as shown in the illustration. One application usually is sufficient for old bearings, but two or three probably will be necessary on new ones.

One of the chief difficulties of lapping in bearings formerly was the tendency for the hard abrasive to stick in the bearing metal and continue to grind after the lapping operation had been completed. The breaking down or neutralizing feature of Timesaver after the lapping process has been finished, of course, has eliminated any danger of a cutting action going on indefinitely. This compound is made by the M. K. T. Products Co., Seattle, Wash.

Securing Publicity Through Social Events

It has now become quite the thing for bridal couples to take their honeymoon trips by automobile. In this fact lies a splendid chance for the dealer to get some good advertising. Every time a bridal couple starts out on a honeymoon trip in a car sold by the dealer, the latter should put an advertisement in the local papers reading about like this:

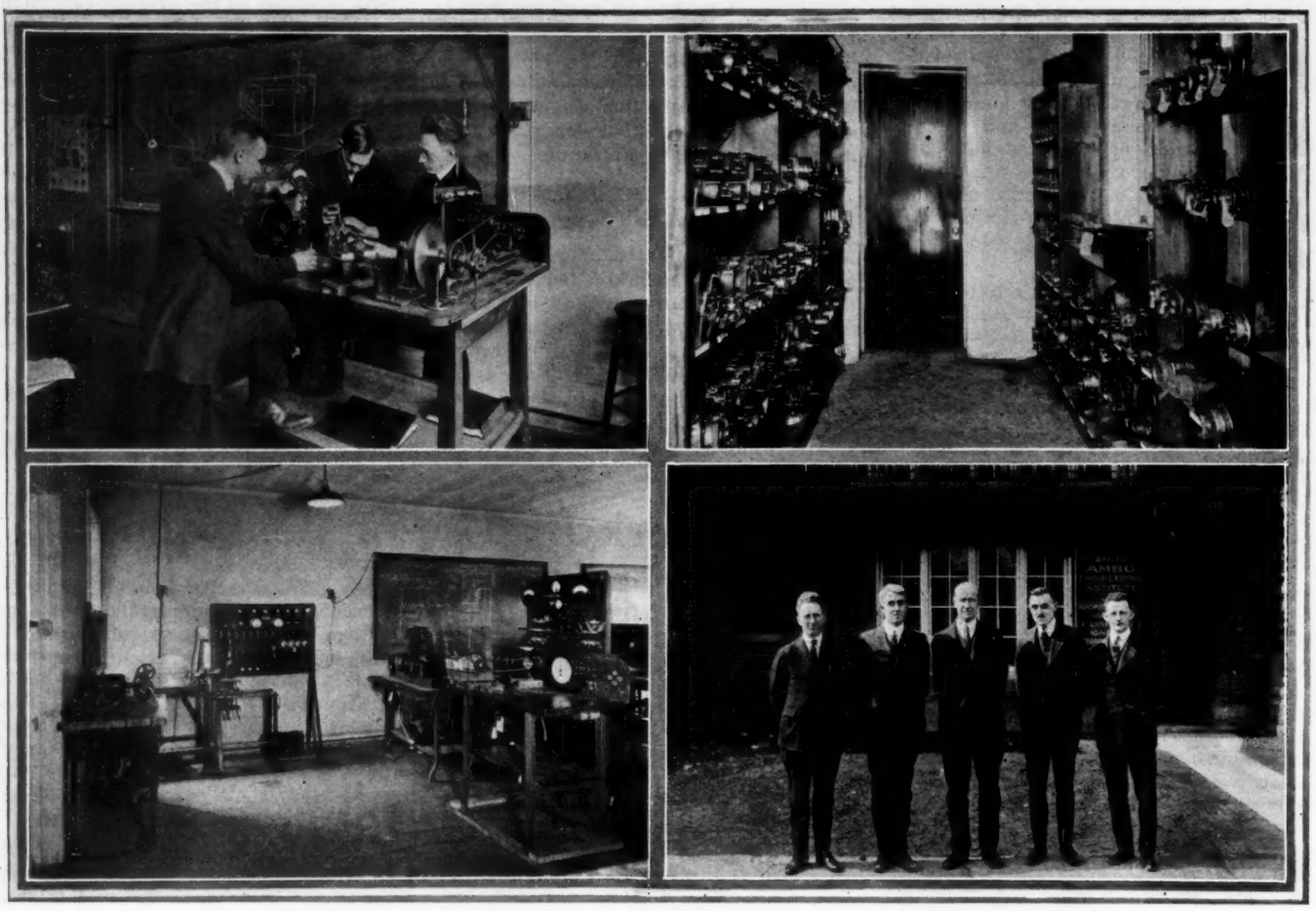
"Of Course It's a Whizzer Car Sold by A. C. Smith!

"Mr. and Mrs. O. O. Brown, who were just married yesterday, are taking their honeymoon in an automobile. The car selected for their trip was a Whizzer.

"Naturally Mr. and Mrs. Brown wanted a car that would be the acme of comfort and that would be certain to render the best possible service with the least trouble. That's why they selected a Whizzer.

"Let us tell you about other prominent local people who have recently selected the Whizzer in preference to all other cars."

Such an advertisement would be sure to be widely read and commented upon and would, therefore, do the dealer considerable good.



Top, left, one of the ten tables used in the ignition department. When the instructor gives instruction to one man, both men at the table get the information. The other views show the different styles of test benches and other equipment. Lower right, the faculty. Left to right the men are A. H. Packer, ignition; W. R. Stewart, starting and lighting; Henry Peers, battery; W. N. Littlewood, dean; R. R. Haugh, fundamental electricity.

Making Automotive Electricians

How One Chicago School Trains Men, Many of Whom Already Are Established in Business, to Do Better Work

WITH the greatly increased production of late years in motor cars, trucks, tractors and airplanes there has come a greater need for skilled men in the maintenance of automotive apparatus. Especially is this true of the electrical end of such work. Back in 1912 only a few cars were equipped with electrical systems, but today every car, airplane, truck and tractor is fitted with a more or less elaborate electrical system.

The general adoption of electrical systems by makers of automotive equipment made it difficult for the average man in the shop, who might be an excellent mechanic to keep abreast with the rapid development of the electrical systems, without special training.

Early in the history of the automobile it did not require an expert to handle electrical work, because in those days the average car was fitted up with only a few dry cells, a coil and the plugs in the cylinders. It was a simple matter then to locate and remedy troubles. But the coming of the starting motor, generator, magneto, distributor, battery and hosts of other things electrical changed matters. It meant more automotive electricians. It still holds true today. Seventy-five per cent of the repairs on cars are electrical.

FACULTY HIGHLY TRAINED EXPERTS

In answer to the demand for men trained in automotive electricity, the Ambu Engineering Institute, Chicag,o was founded in 1919. Only automotive electricity is taught. Motor car mechanics are not entered into only insofar as they may be affected by the electrical system. The concentration on the one subject makes it possible for the school to adopt unique teaching methods and equipment of the most elaborate kind.

Automotive Schools

BEGINNING in this issue MOTOR AGE is going to tell its readers about some of the schools in various parts of the country devoted to automotive subjects. Some of these schools embrace in their course but one subject, such as automotive electricity, while others take in the entire chassis.

Many dealers have found it advantageous to send one or two of their men to these schools, especially where such men are to be made foremen of the shop, service manager, etc. The trend of modern maintenance work on automotive vehicles is towards better work and methods and some of the better class of schools are doing excellent work in the furthering of such methods.

In a school of any kind the faculty is important. The value of a school, especially a technical school, depends to a great extent on those who arrange the course. It is highly essential that the teaching staff be composed of men familiar with the practical end of what the school is teaching. In selecting the faculty of the Ambu Engineering Institute four things were required:

1. *Each instructor must have been technically trained at some recognized university or technical school in electricity.*

2. *After graduation from such a school each instructor must have been engaged for at least 5 years in actually working on motor cars, trucks, etc.*

3. *Each instructor must have had teaching experience.*

4. *The personality of each instructor must be such that he will be popular with the students.*

Each instructor has carefully laid out his part of the course. Having actually worked on cars with the same class of men as the students, the instructors know quite well what the students need and how to talk to them in a language with which they are familiar. This fact was impressed upon a representative of MOTOR AGE who sat in some of the classes.

A bit of information regarding the students is of interest.

Their average age is 31 years.

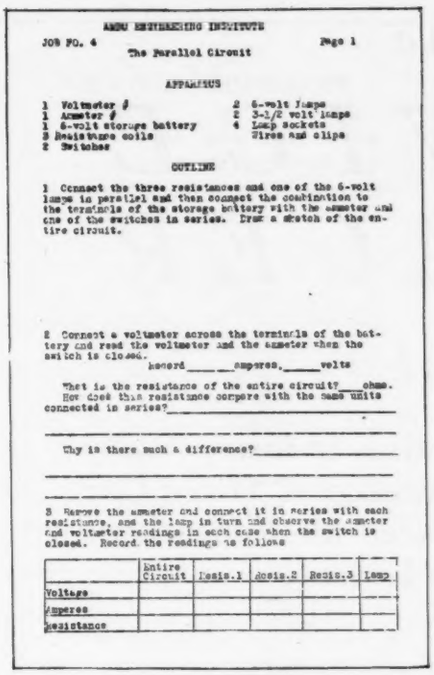
Twenty-one per cent of them are married.

Eighteen per cent own their business.

Forty per cent have had 5 years or more experience.

Ninety per cent have had automotive electrical experience.

The course itself is divided into four divisions, each division requiring 2 weeks, of 40 hours per week. The first division takes in fundamental electricity. The second, starting and lighting, and the third and fourth, ignition and storage batteries, respectively. The classes are restricted to twenty students to an instructor. This is done to insure personal attention to every man.



AMBU ENGINEERING INSTITUTE

JOB NO. 4 Page 1

The Parallel Circuit

APPARATUS

1 Voltmeter 0
1 Ammeter 0
1 6-volt storage battery
3 Resistance coils
2 Switches
2 6-volt lamps
2 3-1/2 volt lamps
4 Lamp sockets
Wires and clips

OUTLINE

1 Connect the three resistances and one of the 6-volt lamps in parallel and then connect the combination to the terminals of the storage battery with the ammeter and one of the switches in series. Draw a sketch of the entire circuit.

2 Connect a voltmeter across the terminals of the battery and read the voltmeter and the ammeter when the switch is closed.

Record _____ amperes, _____ volts

What is the resistance of the entire circuit? ___ ohms.
How does this resistance compare with the same units connected in series? _____

Why is there such a difference? _____

3 Remove the ammeter and connect it in series with each resistance, and the lamp in turn and observe the ammeter and voltmeter readings in each case when the switch is closed. Record the readings as follows

	Entire Circuit	Resis.1	Resis.2	Resis.3	Lamp
Voltage					
Amperes					
Resistance					

Typical lesson sheet used by the student. At the end of the course he keeps these as reference sheets

HOW CLASSES ARE HANDLED

The last 2 weeks' period is devoted to the storage battery, its construction, inspection, repair and maintenance. This is done because it is felt the electrical repairman will have a much better understanding of starting, lighting and ignition, if he knows the storage battery. The student is required to tear down and rebuild old batteries, just as would be done in a service station. He also is taught how to assemble new batteries from new material. Several inspection visits are made by each class in a body to battery service stations and factories.

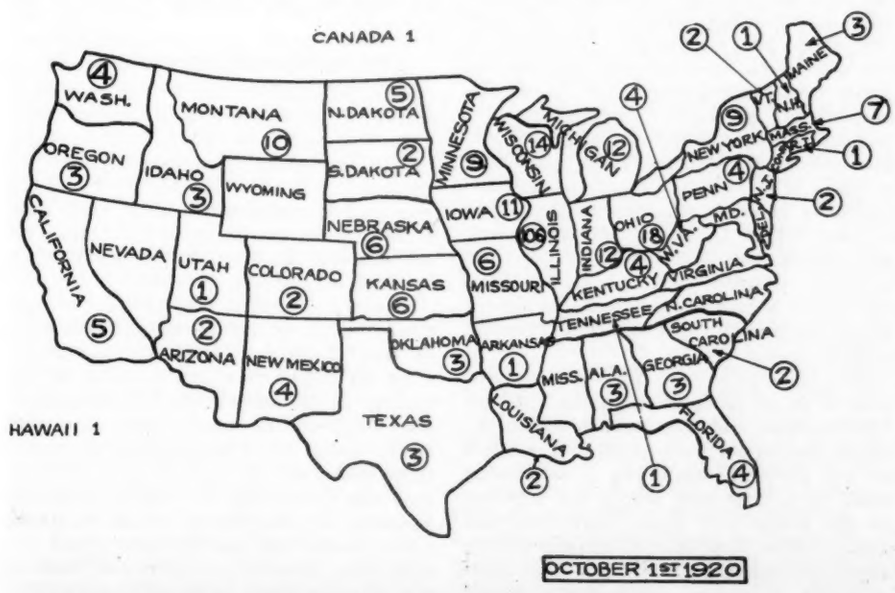
The members of each class are divided into groups of two men each, and to each of these groups is assigned a bench where all the experimental work is performed. Each work bench has an enclosed compartment beneath it which contains all the necessary equipment for the students in each group to carry on their experimental work.

At the beginning of each period the students are assigned a "job" and they are supplied with detailed printed instructions as to how to proceed to carry on the experimental work. After a thorough explanation of the work, attention is called by the instructor to any special precautions to be observed in carrying out the work, and to any points or features which may demand special attention on account of their importance.

At the close of each day's work the students are provided with a list of questions which bear directly upon the "jobs" performed during the day. The questions are studied by the students and they are answered in writing on a separate sheet of paper.

At the opening of the school on the following day the instructor goes over the list of questions very carefully and discusses them with the entire class. Each student is given an opportunity to verify his answers. The students then write the correct answers in the blank spaces on the question sheets.

There are approximately 2,000 questions in the entire course and approximately 100 "jobs." These questions and experimental results obtained in performing the "jobs," when properly filled in by the student, constitute a very complete text on automotive electricity.



This map shows the number of students from each state who attended the Ambu Engineering Institute the first year it operated. One came from as far as Hawaii

Distance—One-Half Gallon of Gas

A good idea for the dealer who handles a car having a particularly high gasoline mileage, would be to erect mile posts on all the principal routes leading into his city on which could be noted the distance to his garage in gallons of gasoline in the car he handles.

For instance, if the car averages eighteen miles to the gallon and he erected a post nine miles out, the sign on the post would read like this: Distance to Brampton, ½-gal. of gas—if you drive a Whizzer car sold by Jones Bros., 123 Main street." Such signs would be sure to attract a lot of attention and create a lot of comment.

TO NAME BACHELDER'S SUCCESSOR

New York, July 12—The Executive Committee of the American Automobile Assn. at a recent meeting named a committee of three—George Diehl, president; David Johnson, past president and Horace Donnell, treasurer—giving it authority to appoint a successor to A. G. Bachelder, the late executive secretary who was killed in an airplane accident near Langley Field. The committee will announce its selection within the course of two or three weeks.

The SERVICE MANAGER Speaks:

Employees in Automotive Industry Sadly Lacking In Exact Knowledge of Motor Car Structural Details. Need for Educational Campaign Urgent

A. G. PROSPERI
Service Manager of the Southern Oakland Co., Atlanta.

Mr. B. M. Ikert,
Editor, MOTOR AGE,
Chicago, Ill.

My dear Ikert:—

I have just received your very fine letter, and I must say that you make a fellow feel so good that if I had much stuff like you handed to me, I would surely blow up. As you know, a service man, especially one of the old line that has been in the business a long time, never receives any compliments or never gets a pat on the back. He is entirely on the defensive and none of the good things that he tries to do are brought back to him, but all of the bad things that he does hit him in the face the next morning, and when we do receive a smile, such as you send us, we surely appreciate it.

I do not like to be long-winded, but there are just some things that I have noticed very forcibly in the last six months in connection with our business—I mean the automobile business in general—which I would like to point out to you. We, of course, have known these things for a year or so, and I am going to try to show you what we are doing to overcome them.

DON'T KNOW BUSINESS

I want to point out to you the things which I have noticed in my travels, and I am sure they will impress you if you think as much of the automobile business as I do.

Now the sad thing which I find is, that the majority of the people employed in the automobile business know less about the business at which they are working than the employees of any other line of merchandise. I make it a point to go into the smoking rooms of the sleepers for a while, listen to the conversations, and eventually pick out a man that looks like he is willing to talk a little, and get in a conversation with him. I find that if he is selling shoes, he knows all about shoes; he knows whether the leather is hemlock tanned or oak tanned; he knows how many stitches to the inch in the uppers and how many stitches to the inch in the soles. He also knows what the other manufacturers are doing in the shoe line.

ELIMINATE THE INEFFICIENT

I talked to a drug salesman, who knows all about the drugs that he is selling and what effect they have on the human anatomy; he knows where these drugs come from, how they are made, and just as much about them almost as the manufacturer. I also talked to a hardware salesman; he knows all about hardware, knows the kind of steel in the different pots and pans, knows the process of making the enamel ware, also knows what the other manufacturers are doing.

But when I talk to an automobile man, he does not know the specifications of his car, nor does he know the specifications of any other make of car. He does not know the engineering principle of the car which he is selling, he does not know why the engineers have made the connecting rods light or heavy; he does not know why his factory adopts a certain policy; he does not know what kind of steel is used in the frame of the car, nor does he know what an artillery type wooden wheel is, and practically every automobile specification specifies the artillery wooden type wheel. I have yet to find a man on the road that knows what the words "Artillery type wooden wheels" mean.

This convinces me that there have been a lot of hangers-on in the automobile business and they have hung on because conditions were such that we had to put up with them, but it is coming down to a time now where the survival of the fittest will again prove out and these fellows that do not know anything about the business that is making them a living, will be automatically eliminated.

This condition is also very manifest in the mechanical work which I find throughout the country. In talking to an owner who has recently purchased a car, regardless of the make, I find that some of the salesmen making the sale, told him some things that were indeed outlandish. Everything points to the fact that we have in front of us a great educational campaign.

Of course I attribute the foregoing conditions to the fact that every one who knows anything about the business has been too busy making automobiles to tell anybody else anything about the business in general. You of course know the rapid growth of our business and the men that developed it have spent their entire time in the last fifteen years, improving and developing the wonderful machine, which is now known as the "automobile;" and those men, of course, have no time to spare to teach anyone else, but I very much regret to say that the majority of the employees in the automobile business have not troubled themselves to find out anything about it, as sales and jobs have come to them too easily and they have been able to get by with the least amount of energy expended.

AN EDUCATIONAL CAMPAIGN

Last September the writer started a school of instruction for our employees. This was in line with my idea of starting up an educational campaign and I thought the best place to start was in our own organization. Since that time I have been out on the road lining up our dealers, but I am frank to say there is a lot of work to do yet.

The school which we started on September 23 is still running and has been of great benefit to our own employees.

In an industry which is growing as rapidly as the automotive industry, there are hundreds of present-day problems which are of more immediate importance than those of the future, and that is just one thing that is wrong with our business at this time—we have never spent much time on the future, and for that very reason we were the first to feel the depression as we were not organized to cope with it. We had made no preparations, as business had always been

good enough, so why worry about the future?

We believe that within the next three years six million more complete machines will be built and equipped; this means that there will be six million machines more to be stored, supplied with gasoline, oiled, washed, taken care of repaired and rebuilt; these figures are so big that even the leaders of the automotive industry hardly realize its meaning; and if such is the case, don't you think it is about time that some of us were learning something about our business?

THE OWNER KNOWS

I fully believe that many a sale has been lost because the prospective buyer felt that the salesman did not know what he was talking about, and that prospective buyer looked around until he came in contact with a man that did talk as if he knew something and from whom he purchased the car. He did not buy the particular make of car the salesman was selling because he wanted that car, but it was because the salesman probably knew a little bit more than the other fellow, and impressed the purchaser, so much so that he bought his car, thinking that he was getting a better car than he could buy elsewhere.

It is just this that I am trying to point out—the men who are selling automobiles today, that is some of them, of course (you know I can't mean all of them, especially the factory hands), do not know anything about the product that they are handling.

We have got to keep abreast of the times; we find that the automobile owner is beginning to search for the service station or the garage that is run on a strictly business basis. Owners want, and are beginning to demand, the same kind of courtesy, the same fair dealings, and the same fair charges in the automotive industry that they receive from other merchants of their community.

Service managers and garage owners, however, cannot be successful and render that same service unless they have the support of sufficiently well-informed men in their organization. There must be the same efficient team work and willingness to work together that we find in other commercial lines.

In carrying out this principle, no matter how experienced an employee is, he must add to his knowledge in every possible way. He must not only give the highest grade of service but he must be able to aid and instruct new employees in their duties, so that they too may become efficient as soon as possible.

To new employees the necessity for gaining a knowledge of the automotive business as quickly as possible must be plainly apparent. To gain such knowledge, new employees are urged to study everything available pertaining to the automobile business that will benefit them and thus make their service of greater value.

We believe that any employer will be glad to help his efficient and ambitious men to prosper as he prospers, which he is bound to do, if he has an efficient, courteous, and well-trained organization behind him.

We know of nothing finer than an employee who desires to use unselfishly his knowledge and ability in the interest of others.

We do not want to stop up your ears with too much "Wind blowing out of the south," but we are happy to say that we recognize conditions just as they exist; they are staring us in the face, and there is no use kidding ourselves any longer; these things have GOT to be overcome, and the only way to overcome them, is to acknowledge the truth to ourselves, get down to brass tacks, and work like the devil.

We have what we think are some very interesting letters that we send out to our owners from time to time, keeping in touch with them and leading them to believe that service with us is a personal matter, and we make it our business to get personally acquainted with them. We are also endeavoring to educate our retail salesmen up to the point that they will know the goods they are selling so well that they could stand up and talk to any one in an intelligent manner on every part of the car—the mechanical end, the body, the trimming, the principle of the engineering design, and such things as that, and we are beginning to feel the benefit.

Your letters are short but sweet and mine are long and windy, but it is an ill wind that blows nobody good.

With kindest personal regards, and wishing you the best of luck, I am,

Sincerely yours,
A. G. PROSPERI,
Service Manager,
Southern Oakland Co., Atlanta.

Service Managers

HERE is your opportunity to get a lot of things off your chest. You may or may not have some grievance against the business in which you are engaged, but at any rate here is a chance for all of you to sit around the table and talk over a lot of common problems. We feel sure that after you read what Mr. Prosperi has to say on these two pages that you will want to sit down and write us along similar lines. Remember, this is your department and you can say what you like. Have you any new thoughts on service? Tell us about them.

Armored Concrete Roads Give Excellent Service

PARIS, June 20—Armored concrete as a road surface has made its appearance in France and has been experimented with in the city of Lyons with good results, according to the report just issued by the municipal road engineer.

This invention is the property of the Pont-a-Mousson Steel Works, one of the biggest firms in France specializing in iron pipes. A concrete foundation, varying in depth from four to eight inches, according to the amount of traffic to be carried is first laid and given a surface dressing of fine cement about half an inch in thickness.

Before this is quite dry it receives the cast iron armature, the elements of which are roughly square frames 1¾ in. in height with a spur from each corner, and are laid staggered, the covering being 16 to 25 to the square yard, according to the amount of traffic intended to be carried.

The base of each cast iron member is slightly reinforced in order to give it a better seating in the cement. Finally a layer of concrete composed of fine Portland cement and quartz chips is laid over the metal armature and carefully stamped down so as not to disturb the elements. When finished the metal is hidden, the road having the appearance of an ordinary concrete highway.

According to the report issued by the road engineer of the city of Lyons, after the road had been in service for six months, during which time it had carried exceptionally heavy traffic, the results are satisfactory. It is stated that the metal armature now slightly projects, but not sufficiently to cause any inconvenience to traffic, and so slightly that for all practical purposes the surface can be considered as perfectly smooth. Water flows off easily and the street is less dusty than others paved with granite blocks.

The cost of construction of this experimental road was $5.30 per square metre (nominal exchange), but this was higher than normal, owing to the total inexperience of the workers in this class of road construction. It is estimated that after a little experience the cost would be reduced to $5 per square metre, or even less.

Other experiments have been carried out in towns in the east of France, where armored concrete roads have been in use for nine years. It is found that with the correct mixture of surface dressing there is only a very slight tendency, after a long period, for the cast iron members to project above the surrounding surface; even when considerable wear has taken place there is no inconvenience to vehicular traffic.

The cost of construction on a pre-war basis is given by the Pont-a-Mousson steel works as $3.80 per square metre for their armored concrete road, compared with $4.45 for asphalt, $4.46 for wood blocks, $4.77 for granite blocks on sand, and $5.32 for granite blocks on concrete. One of the main advantages claimed for the armored concrete road is that maintenance costs are practically eliminated, whereas wood paving blocks cost as high as 42 cents per square metre per annum.

Scripps-Booth Adds Medium Weight Six

Car Said to be Lightest Using Continental 7-R Engine— Frame Has 7-in. Section—Springs Unusually Long

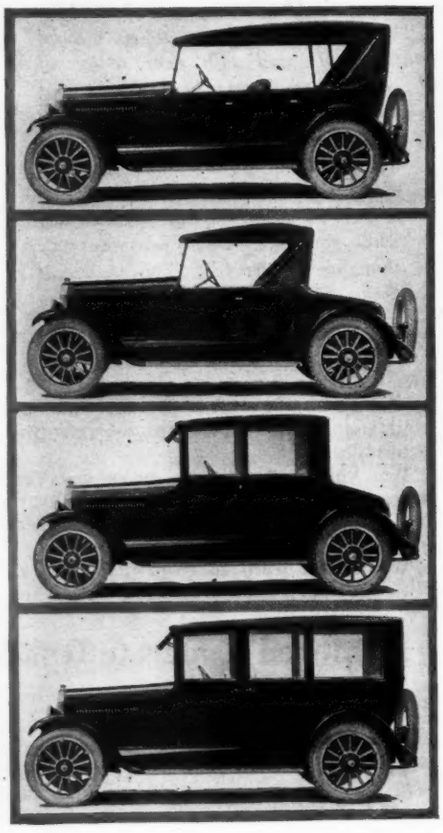
THE medium weight six, which the Scripps-Booth Corp. has added to their line and which is now in the hands of dealers throughout the country, incorporates some interesting sales features. The car was designed with the object of having a compromise between strength and lightness, being of such a weight as to provide economy, and with sufficient strength in the parts to be of satisfactory proportions for ordinary road use.

The car incorporates the Continental engine, this being the six-cylinder, 3¼ by 4½ in. model 7-R unit. This engine delivers its power through a 10 in. Borg & Beck single plate, disk clutch, two Peters universal joints and the new General Motors axle.

One of the features of the construction of the car is the chassis frame which is 7 in. deep and so formed and reinforced as to prevent weaving and sagging strains. The springs are also of exceptional interest, being extra wide and long. The combined length of the springs is 184 in., longer, it is claimed, than any other car of this length. Cord tires are furnished as regular equipment and the wheels are of the steel felloe, wood type.

With a wheelbase of 115 in., this car is probably one of the lightest, if not the lightest product using the Continental 7-R engine. This engine is familiar to the trade and is a unit which develops more than 50 hp. on the block. It is of removable head and oil pan construction, the lower portion of the crankcase being aluminum, heavily ribbed and reinforced. The engine has a four-bearing crankshaft 2¼ in. in diameter, a four-bearing camshaft and enclosed valve mechanism.

The clutch and transmission are housed in unit powerplant style, the gearset being the new universal, three-speed selective type. The gasoline system comprises a 15 gal. tank at the rear end of the chassis, with the gasoline supplied to the engine by the Stewart vacuum system. The carbureter is a Stromberg, 1¼ in., with hot air connections. The cooling system is a pump circulating type, the radiator being a new, straight front design with a nickeled shell. The radiator has a detachable core.



Complete line of the medium weight six which Scripps-Booth Corp. has added to its product

The axles are General Motors products; the front axle is an I-beam forging, the spindles being fitted with New-Departure ball bearings and the rear axle is a floating type with a single bearing and spiral bevel drive. It is mounted on Hyatt roller bearings in the hubs and differential and New Departure ball bearings on the pinion shaft. The brakes are internal and external with a braking surface in excess of 250 sq. in.

One of the main features of the chassis is the spring suspension. This is semi-elliptic with bronze bushings in the springs. The front springs are 36 in. long and 2 in. wide. The rear, which are underslung, are 56 in. long and 2 in. wide. The frame is of pressed steel channel, the depth of the frame being 7 in. and the width of the frame 2 in. The frame is drilled for snubbers.

The wheels are Kelsey artillery type with steel felloes, with wire wheels being provided at additional price. The tires are Goodyear cord, 32 by 4 in. ribbed front and non-skid rear. The rims are, of course, mounted.

The accessory equipment is complete, the chassis being lubricated by Alemite high pressure lubricating system and, in addition, there is a handy light for illuminating the engine at night. There is a dial type of oil level indicator on the engine, hand grip release instead of a push button on the brake lever, spot light socket and glove box in the instrument board and the usual line of equipment including speedometer, ammeter, adjustable head lamps and non-glare lenses. The enclosed cars and the roadsters are finished in blue maroon, and the touring cars in dark Brewster green, with natural wood wheels and black fenders. The upholstery on the open models is genuine leather and wool coach cloth on the enclosed cars. The price of the touring car is $1490; roadster, $1470; sedan, $2375; and coupe, $2350.

New Holley Carbureter on Market

A NEW carbureter of simple design and incorporating a number of interesting features is being produced by the Holley Carbureter Co. There are no moving parts, as air valves, needles, dash pots, etc., as the carbureter is of the plain tube class having but one master nozzle for both idling and wide open throttle work.

Two holes located above and below the throttle plate give this control. On idling, the upper hole only supplies the mixture, the lower one acting as an air bleeder. As the throttle is opened slightly, the bleeder action is reduced, thus maintaining the mixture proportions. On further openings, both holes are exposed to suction above the throttle. Both act as fuel outlets to supply the extra gasoline made necessary by the larger volume of air passing the throttle.

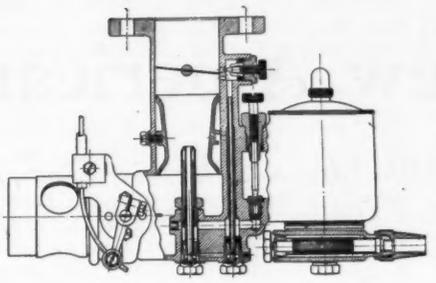
All of the screws are made of nickle steel to resist rust and also to make it impossible to twist off screws which are depended upon to hold permanent adjustments. No tools are necessary for removing the cover of the float chamber which is held in place by a spring lock, acting in very much the same manner as a bayonet lock, except that it is continually under tension.

Another feature is the strainer, which may be easily dissembled and cleaned without removing the gasoline connection or in any way disturbing the installation of the carbureter. The strainer is cylindrical in form and pulls out at the end opposite the gasoline intake. The dirt is left on the inside of the screen since the gasoline passes from the inside to the outside in entering the float chamber. When removing the strainer, there-

fore, all of the dirt is removed with it, and the gasoline left free of any deposits which may have entered during the course of operation.

The master nozzle is adjusted by a needle valve and in its effect upon wide open throttle has a major influence. The idle has an additional adjustment directly below the flange, which is used for extreme low speed. When driving at the lower speeds, with partially closed throttle, there is an accumulation of fuel in the well, and upon opening the throttle, this accumulation becomes immediately available as a means of enriching the mixture for maximum rate of acceleration.

There are no passages leading to the atmosphere, for it has been found that such passages, when small, become filled with dust and dirt, and materially interfere with the accurate functioning of the carbureter. The further advantage of placing these passages so that they take air from within the carbureter itself lies in the fact that in placing of drawing cold air, warm air is supplied from the main carbureter entrance, which, with present day fuel, is always connected to a suitable stove or heater.



Sectional view of the new Holley carbureter

The carbureter is universal in its installation, inasmuch as it is possible to swing the strainer and gasoline inlet connection around to any point below the float chamber; and also the choke connection can be set to be controlled from either side, or from any direction. The carbureter may be readily cleaned by removing the nozzle from the bottom, and these are so designed as not to require gaskets. The carbureter is at present being manufactured in 1 in., 1¼ in. and 1½ in. sizes, top outlet, and a series of side outlet carbureters will soon be in production.

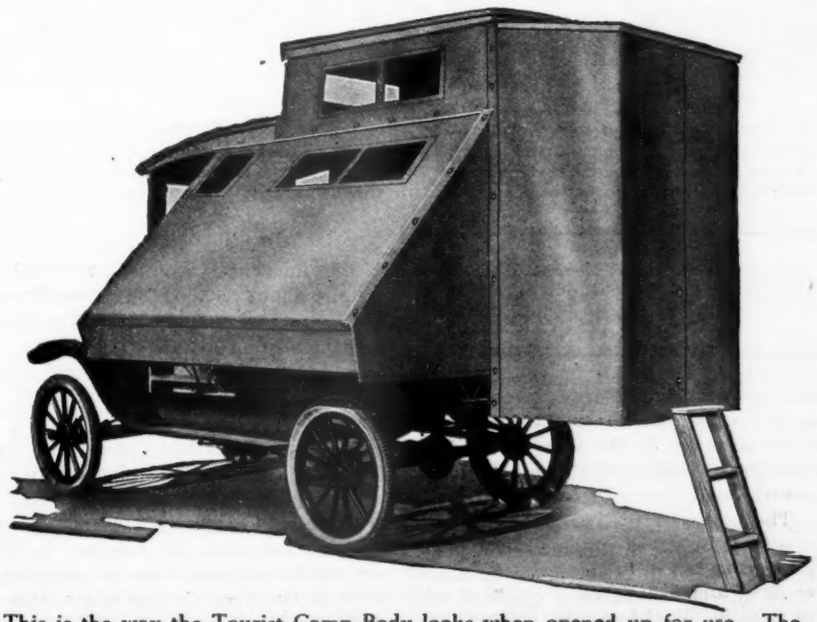
Tourist Camp Bodies to Fit Standard Chasis

DEALERS who are on the alert for new lines to handle will be interested in the Tourist Camp Body, a simple, practical and compact body to fit all makes of cars, which can be quickly converted from a five-passenger touring arrangement to a bungalow on wheels.

The body contains two full sized berths, kitchen cabinet, sitting or dressing room, rear porch, ample ventilation and protection against storm. As a touring body all bungalow fixtures are hidden, folded compactly and ready for use again by means of a simple spring mechanism. The body was designed especially for cross country touring.

The top is arranged so it may be raised by a simple mechanism to give a standing room of 6 ft. The tail gate is convertible and makes the rear porch allowing floor space of 88 by 42 in. The berths open 36 in. wide by 78 in. long and can be completely removed in one-half hour, if desired, thus affording a commercial car for light delivery work.

This body is made in two models, A and B. The former is for cars of 100 in. wheelbase, as Fords, Dodge Brothers, and Maxwells and weighs 500 lbs. Model B fits cars of 124 in. wheelbase as Buicks and Reo Speed Wagons and weighs 600 lbs.. The price on Model A and B is $400 and $500 respectively. Both are finished in Brewster green striped with white. It is made by the Tourist Camp Body Co., Chicago.



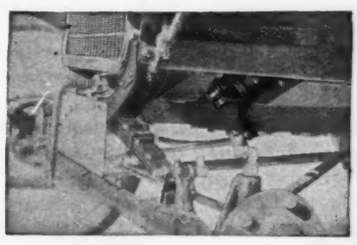
This is the way the Tourist Camp Body looks when opened up for use. The berths are on the side and at the rear is the dressing room. The top provides 6 ft. headroom

Columbia Irreversible Steering Gear for Fords

A NEW device for Fords which, according to the claims of the manufacturers, absolutely prevents road shocks and vibrations from being communicated through the Ford steering column to the triple pinion reducing gears in the steering wheel hub, and so to the arms of the driver, has been evolved by the Columbia Carbureter Co., 111 W. Monroe St., Chicago.

The ingenious contrivance, designed to take the place of the stock supporting bracket at the bottom of the Ford steering column, is so drilled with correctly spaced holes that it aligns perfectly with the holes already in the frame. It is constructed on the compound cam principle, so that any impulse originating at the road wheels is claimed to be positively absorbed on two lines at absolutely square right angles through two cam centers no matter in what position the front wheels may be.

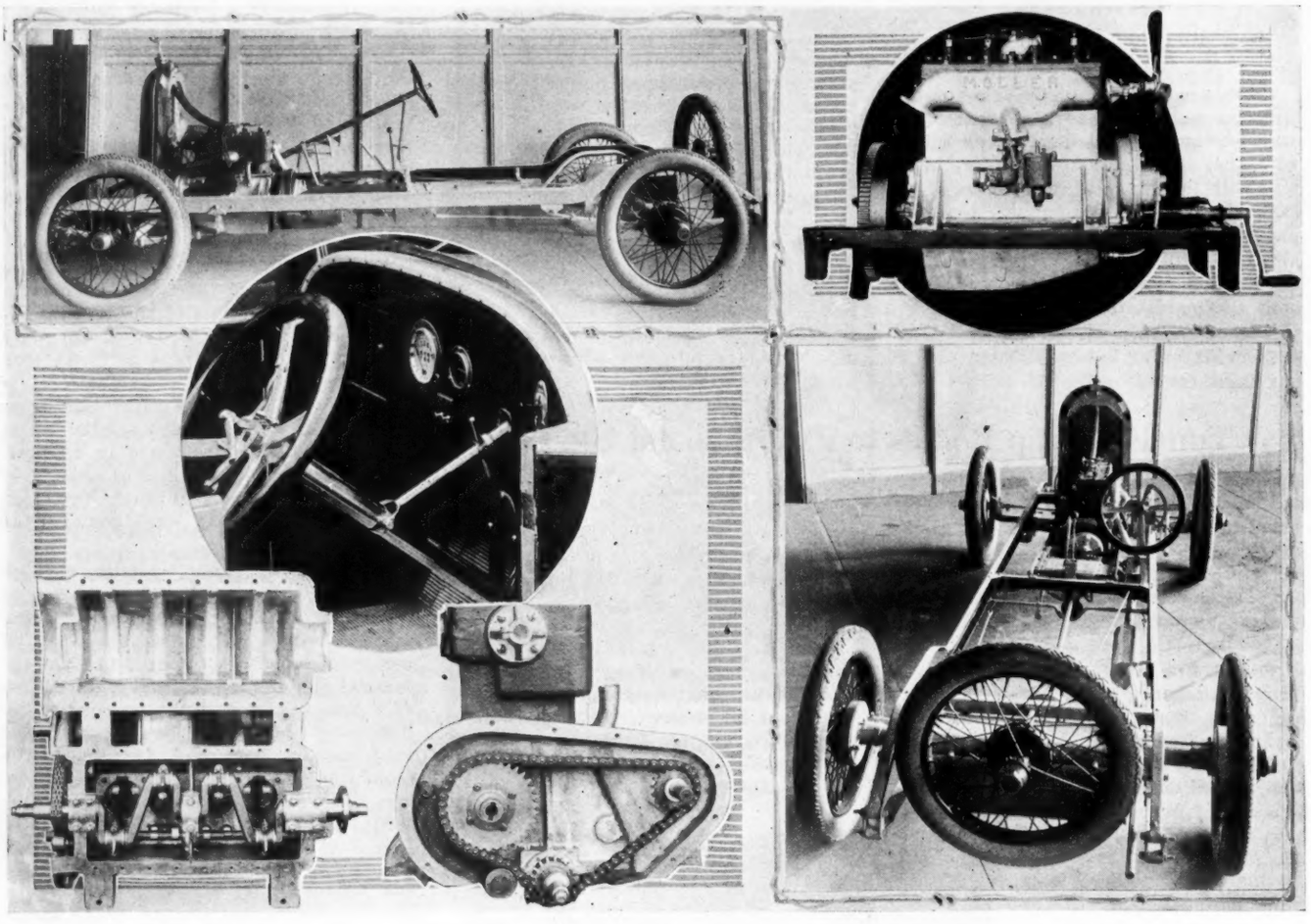
Beside the irreversible feature it is asserted that the gear effects an additional reduction of one-eighth of a turn of the steering wheel. This has the effect of reducing the efforts required to steer the car and also the load on the triple pinion reducing gear. A full appreciation of this latter point will be had by those Ford owners who have equipped the front wheels of their car with the 3½ in. size tires, as the additional leverage afforded by the Columbia Steering Gear serves to reduce the labor of steering through sand and mud. Priced at $12.50 the Columbia Steering Gear will be marketed through the jobbing trade exclusively.



Top illustration shows the installation of the Columbia irreversible steering gear for Fords. The other view is a close up of the device

Moller a New American Light Car

Car Weighs 850 Lbs.—Chassis Has 100-In. Wheelbase and 50-In. Tread—Car Designed Along European Lines



A group of illustrations showing details of the Moller car. The two views of the chassis will give an excellent idea of the general design. In the circle at the left is shown the adjustment on the steering column to change the rake. It will be noticed from the lower view how easily the bearings are reached by removal of the crankcase. The front end drive is by chain, with an exterior adjustment. The engine is very accessible, as shown in the upper right hand illustration

Better Roads and Economic Conditions May Bring the Light Car to America.

FOR a long time the question, "Why doesn't some manufacturer in this country bring out a small car like those in Europe?" has been heard on many sides. Many will recall that in 1914 this country was temporarily afflicted with the cyclecar craze and that at that time a few very excellent small cars were produced. However, the war made serious inroads in the cyclecar and light car industry, with the result that it was practically wiped out by 1916.

Now along comes a new light car patterned much after the European models. The car is called the Moller and made by the Associated Motors Corp., 1926 Broadway, New York. The car is intended primarily for European consumption, but cars will be marketed in this country also. It is the intention of the company to make about 300 the first year.

The company states the car will average 25 to 30 miles to the gallon of gasoline, from 18,000 to 20,000 miles on a set of tires and 500 miles on a quart of oil. Cars sold in the domestic market are expected to sell for about $2,000.

The chassis, illustrated herewith, has a 100 in. wheelbase, 50 in. tread and weighs about 850 lbs. The total weight with two seater body is said to be approximately 1100 lbs. The engine has four cylinders of 2¾ in. bore cast in block with detachable L-head. The stroke is 4 in.

The crankshaft has three white metal bearings. The front bearing is 2 in., center bearing 1¼ in. and rear bearing 2¾ in. long. The camshaft is also carried in three bearings. It is driven by Whitney chain and an idler is provided to take up the slack in the chain, this adjustment being made by turning a locknut and set screw projecting through the crankcase.

The valves have cast iron heads 1⅜ in. o.d. welded to carbon steel stems. Connecting rods are drop-forged from .40 carbon steel. Lynite pistons with two hammered piston rings are employed. Both halves of the crankcase are of aluminum.

The engine is designed for high speed operation and is carefully balanced. It is said to be capable of speeds as high as 4000 r.p.m. It develops 20 hp. at 8000 r.p.m., at which speed it will, according to the manufacturers, drive the car at 60 m.p.h. with 4 to 1 gear ratio and 27 in. wheels.

Lubrication is by splash, the pump being bolted to the front plate of the distribution case, where it is readily accessible. Thermosyphon cooling is employed and the fan is belt driven.

An attractive and distinctive honeycomb radiator with aluminum shell is fitted. Ignition is by Eisemann magneto. Bosch starting and lighting units are employed. These are carried on the subframe in which the engine and transmission are mounted and are located just forward of the gearbox. The generator is driven by a spring belt, and the starting motor is fitted with Bendix drive.

The clutch is of the multiple disk type. It has two driven plates and is enclosed by an aluminum case bolted to the flywheel. The gearbox is located amidship, following European practice, and is connected to the clutch by a shaft with two fabric disk joints. Hotchkiss drive is used.

BREAK OF INTERNAL EXPANDING TYPE

The final drive is by straight bevel gear to the semi-floating type of rear axle. The propeller shaft brake is mounted just back of the rear universal joint. This brake is of the internal expanding type and foot operated. The hand brake is also of the expanding type and is located in the rear wheels. The front axle is built up of square section tube. The spindle yokes are welded into the ends.

All the springs are semi-eliptic. Those in front are 31 in. long and the rear pair 40 in. long. The leaves are tapered, being thinner at their outer ends, and are made of silico-vanadium steel. Lubrication of chassis parts is accomplished by providing 21 Alemite connections at necessary points.

Five Stewart wire wheels, with four 27 x 3⅜ in. clincher tires, are furnished as standard equipment. The road clearance is 8 in.

One of the novel features of the car is the adjustable steering gear. This is of the worm and wheel type and is mounted on top of the chassis frame, with the steering arm outside. It can be furnished for either right or left hand drive, as desired. The steering column can be raised or lowered from the driver's seat to suit the driver's convenience. It is locked in the desired position by an adjustable link, the forward end of which is connected to the dash.

Low Maintenance Cost Embodied in New Durant Car

PRODUCTION of the new Durant car will be started at the Long Island City plant about Aug. 1. It is understood that approximately 20,000 orders for the car already have been received from the eastern territory. This will keep the plant running at full capacity for a year. Experimental work on the four cylinder car which will sell for $890, has been completed and it is practically ready for inspection.

One of the main advantages of the car will be the low maintenance cost resulting from the remarkable accessability of its various parts.

The body appointments are very well looked after and there are pockets in each door, accommodating the curtain which goes directly over it. The rear door is double with the straps concealed between the plate glass rear windows.

The car, which will weigh 2300 lbs. fully equipped, will be rated at 24 hp. and will develop a speed of 50 m.p.h. on a level road. Tests have demonstrated that it will average 17 miles per gallon of gasoline.

One of the principal features of the chassis construction is the use of two tubular struts between the cross frame members. These are used not only to stiffen the frame and take out a good deal of the weave, but are also used in place of the exhaust pipe and muffler. These simply act as an expansion chamber, and there are no baffle plates used in the construction.

The engine is a 4-cylinder block type, made by Continental, especially for the Durant car. The valves are of the overhead type, are enclosed, and the exterior of the engine is very smooth and clean. Ignition is by a battery system and the coil is mounted on top of the timing gearcase. Servicing has been very carefully considered and all the members including engine, clutch and gearbox can be removed without disturbing any of the other members. The oil pump is of the rotary type, very small, and is on the outside of the crankcase at the right, with the water pump on the left side. Aside from these, and the coil, there is practically nothing on the outside of the engine.

The clutch is of the plate type with a single steel disk which is slotted to allow for expansion under heat and prevent warping of the plate. The plate has a molded asbestos floating ring on each side and the entire assembly is taken out by taking the cap screws out of the cover plate which carries also the expanding fingers.

The instruments are mounted on a sheet steel instrument board, painted, varnished, and grained to represent circassion walnut to correspond with the rest of the woodwork. The steering wheel is solid walnut and the spider is partly aluminum and party walnut, giving a very handsome appearance. Upholstery is in real leather.

The axles are fitted with Timken bearings, and the rear is of the three-quarter floating type. The carbureter is a Tillitson. Springs are semi-elliptic and the extra tire carrier on the rear is so mounted as to make a very stiff job. The tires are 31 x 4 and are on artillery wood wheels.

Reese Aero Car Cheapest on American Market

IN last week's issue of MOTOR AGE there was shown on page 13 an illustration of the Reese Aero Car. We give herewith a description of the car.

Briefly, this is a small car driven by means of an air propeller through a twin-cylinder two-cycle air-cooled 6 hp. engine. It is to sell for $160.

It is stated the car will travel 60 miles on 1½ gals. of fuel. Tires are guaranteed for 7,000 miles. The speed ranges from 2 to 40 m. p. h. Only two control levers are necessary, one for the spark lever and one a foot lever controlling the brake. The engine can be started while sitting in the car.

The car has a 60-in. wheelbase and a tread of 30 in. The road clearance is 9½ in. Tires are 20 by 2 in.

A 12-lb. flywheel is fitted to insure steady running and an Evinrude magneto is fitted in the flywheel. As is the custom with many two-cycle engines, the oil is carried to the cylinders and other working parts through the fuel.

The body is made of birch, buckboard design, in order to impart to it the riding qualities of a spring-fitted automobile. The hood is made of rolled steel and finished in scarlet. A dummy radiator is used, the latter being equipped with shutters to admit varied amounts of air to the engine.

Naturally some sort of protection must be supplied for the propeller and on the Reese car this consists of a sheet steel guard finished with braces and cross braces in accordance with safety requirements.

The car is upholstered in brown leather, with bucket type seats. Tangent wire wheels are fitted with turned steel concave hubs. The foot brake works on the rear axle by friction and a hand brake is fitted for emergencies.

For those sections of the country where there is ice in winter, runners can be attached to the car, thus making it an ice boat. With the ice equipment the Aero Car is said to be able to turn up 60 m. p. h. The weight is slightly over 150 lbs.

Planning and Equipping the Tire Service Station

The Passenger Car Station
Clean, Level Floor Needed
Suitable Types of Jacks
Rim Wrenches to Use
Portable Tool Box
Rim Machine Essential

THE tire business very readily classifies itself into two major divisions. These are divisions having to do (1) with merchandising methods; (2) with a division for what may strictly be called service work. The term service work obviously means methods of applying and removing tires and tire equipment and otherwise taking care of the customer's needs with system and dispatch.

The service station may be the acme of simplicity, as for example, where the work has to do entirely with passenger car tires; or it may be considerably more elaborate if pneumatic and solid truck tires are handled exclusively; or if the business encompasses the selling of both passenger car tires and truck tires, service station requirements will naturally be far more elaborate.

THE PASSENGER CAR STATION

The passenger car station may be, and very frequently is, nothing more than the pavement in front of the dealer's place of business. On the other hand, if a dealer's establishment is connected with a garage or if he has such facilities that owners may drive their cars under cover to be better taken care of, it will be well worth while to exercise care in the arrangement of the equipment. There are a few general principles to be kept in mind when service work is done in the garage or perhaps in an unused open space at the side of the dealer's store.

The first of these is to locate the compressed air outlets in such a way that cars being serviced will not obstruct the entrance or exit. There are few things more discouraging to a customer who may or may not be in a happy frame of mind, and possibly it will be the latter, than to find either the entrance or the exit blocked by another customer with four or five tires that require inflating.

CLEAN, LEVEL FLOOR NEEDED

This trouble can be avoided quite easily by locating the air outlet back from the doors and in such a position that it will be impossible for those who use the air to prevent others entering or leaving the service station.

If service work is done in a garage or another building, it is natural to suppose that the floor will be level and that it will provide a firm foundation for jacks. If service work is done in a vacant space beside the dealer's place of business, the ground should be level and firm.

Service Is Remembered Long After Price Is Forgotten

THAT'S a good line to remember in building up any business, and a particularly good one for the tire business.

For in these days of cut-throat competition it is the dealer who gives real service, prompt service, who gets the business and builds a business.

Giving service means having proper equipment and so placing that equipment that it is of maximum value. For example, the tire changing machine cannot be hidden in the back of the shop; the air outlets cannot be placed where they block the entrances.

Little things like these—and the use of some gray matter—mean real service.

SUITABLE TYPES OF JACKS

Otherwise, there will be constant trouble with cars rolling off jacks and with jacks digging themselves into the ground instead of raising the cars. Some of this trouble can be avoided by providing jacks with broad, heavy, wood bases. Such a base should be of hardwood so it will not crack under the strain, and the dimensions should not be so large as to prevent the jack being put in position when it becomes necessary to tip it to one side as so often is the case in modern cars where there are many obstructions such as tire carriers, truss rods, etc.

The whole subject of jacks is a far more important one than the average individual thinks. The ordinary type of pump or screw jack is entirely inadequate for service work. These are unhandy to use, cannot be easily and quickly placed in position and are seldom rugged enough to stand up very long under constant use. There are only a few jacks of this character that are useful and these are of the expensive type.

The most suitable type of jack is a pump type with a long handle, or a chain jack. It is very easy to locate properly one of these long handle jacks and the leverage provided makes it a simple matter for even a feather-weight to jack up the heaviest cars.

Chain jacks are always adequate for the work and are excellent for use on a concrete or wood floor. There is an objection to them, however, when used on a dirt or cinder floor in that the chain fills the inside of the jack with dirt or cinders which interfere with its proper operation.

There are a number of patent lever-type and wheeled jacks on the market, but most of them are suitable for use only under a limited number of cars. For example, it is generally impossible to use a jack of this kind on a car that is equipped with a bumper, either front or rear, as this device inferferes with raising the handle to a sufficient height to get it in position. However, these various points are some that most tire service men have learned by experience.

It is well to make sure that a sufficient number of jacks is provided to take care of the normal volume of work. It is annoying to a customer to be compelled to wait because the only jack is under someone else's car. Half a dozen good jacks are none too many for a service station that is at all busy.

TYPE OF RIM WRENCHES TO USE

It goes without saying that the equipment will include a number of socket rim wrenches to fit the various sizes of rim bolts. Adjustable rim wrenches are good if used with discretion. They are likely to break with constant use and unless the person using them is careful they are likely to spoil the corners on the nuts.

By far the best plan is to supply a number of non-adjustable brace-type rim wrenches. Four or five will take care of all normal requirements and if this

assortment is backed up by one adjustable wrench, it will be possible to take care of everything that comes into the service station.

PORTABLE TOOL BOX

All the various small tools that are so necessary should be kept in a box provided with a handle, so that the workman can take the whole box to a job and be sure of having everything necessary to finish the work. No end of time is wasted by repairmen leaving a job perhaps five or six times in search of hammers, chisels or pliers, etc. It is a good plan to insist that no workman be allowed to go to a customer's car without his box of tools. He is sure to need something in the box and may need everything before he gets through.

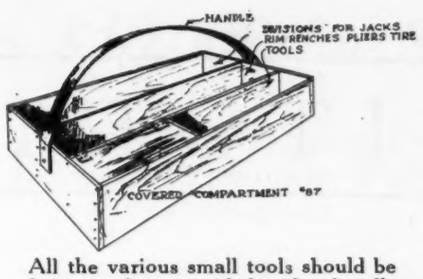
Such a box would include various sizes of rim wrenches, a couple of sizes of adjustable monkey wrenches, several pairs of pliers, light and heavy hammers, chisels, clincher tire irons, etc. Provision should also be made in the box for a number of hardwood blocks to be used in chocking the wheels.

One section of the box should be divided into a number of small compartments with one compartment for each of the various valve parts such as insides, caps, washers, dust caps, dust cap nuts and so forth. The always necessary tire pressure gage should be fastened to the box in such a way that it can never be stolen or lost. A piece of light chain is good for this purpose. The chain should be long enough to allow the gage to be used quite easily.

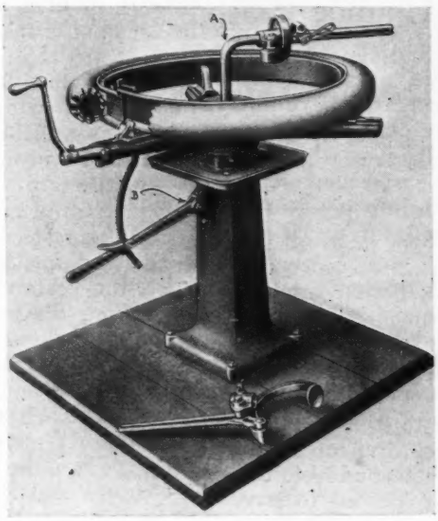
RIM MACHINE ESSENTIAL

Another tool that should be in the box is one for removing valve insides and retreading the threaded portion of the valves. This tool will be used on nearly every job and is almost as indispensable as the tire gage.

Under no condition should workmen be allowed to borrow tools from customer's cars. Borrowing equipment not only creates a bad impression but such equipment may be damaged by the workman and even though it is properly repaired or replaced, the situation is likely to leave a bad taste in the customer's mouth.



All the various small tools should be kept in a box provided with a handle



A rim machine is a real necessity in a fully equipped service station. If the arm "A" is removed by first taking out the bolt "B" wire and disk wheels can be handled as easily as any of the various types of demountable rims

So much for the work of removing rims from wheels and replacing them. For removing tires from rims nothing can compare to the Weaver rim machine. The first cost of the machine may appear a little high to the inexperienced person, but the machine will pay for itself a hundred times over in a year.

Such a machine will open any kind of a standard rim in a fraction of the time it can be opened by hand and, as well, will handle any and all of the various "trick" rims that every once in a while bob up to put the service man on his mettle.

Complete instructions regarding the use of the machine come with it and they are simple instructions to follow. However, nothing is said about handling wire or disk wheels in it, though experience indicates that it can be used to good advantage for this work.

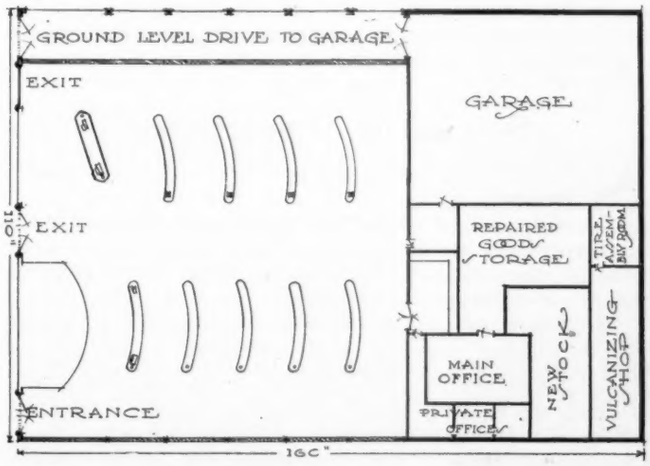
The central arm "A" ordinarily prevents placing wire wheels in the machine. However, this arm can be removed by taking out the bolt "B' and dropping the lever handle to the limit. This releases the arm which can be pulled out at the top.

It is an easy matter then to place wire wheels in the machine and if the tire should be stuck on, the arm "A" can be put back into the machine and used in the manner prescribed in the instructions. It is removed again, of course, before the wire wheel is taken out of the machine. All of the foregoing applies to several of the various makes of steel disk wheels as well.

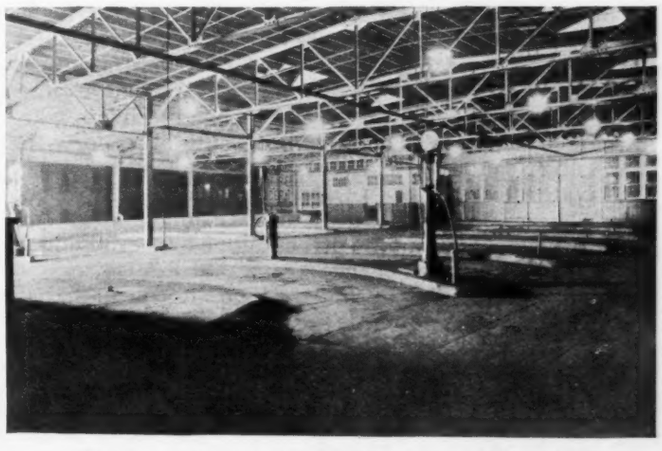
It has been found best in some cases to vary the procedure from the printed instructions when removing large tires from Firestone, Goodyear or other types of solid or non-collapsible rims. The procedure here is first to remove the side rings and after the valve has been pushed back into the casing, the whole casing is twisted at the same time raising it.

If, as so often is the case, the tire has become rusted to the rim, it can generally be loosened by squirting a liberal quantity of gasoline in the crevice between the tire and the rim. The gasoline acts as a rubber solvent and also as a lubricant. It soon evaporates and does no harm.

Handling Wire Wheels, Choosing a Compressor, Proper Pressure to Carry and Storage Tank Capacity Will Be Mr. McMinn's Subject for Next Week.



This shows floor plan of tire service station, office and repairshop illustrated at right, with accommodations for ten cars



This shows the interior of a tire service station with accommodations for 10 cars at a time. Work can be done on any or all of them without interference with the others

EDITORIAL

Give the Mechanic a Chance

THE lawyer has his Blackstone and the physician his authorities on the structure of the human mechanism; the engineer and electrician have their reference books and blue prints; the chemist has his printed formulae and tables of valencies while the mathematician has the solution for nearly every problem, with which he may be presented, in printed form, indexed, cross indexed and tabulated for quick reference.

In the best interest of their clients, patients or patrons each of the above mentioned quasi-public servants—for such they are—is expected to consult and study the printed page and glean therefrom the exact knowledge which will enable him to serve best.

A peculiar condition, the direct antithesis of the foregoing, obtains in the maintenance division of the automotive industry and, for some unaccountable reason, the mechanic or electrician is expected to have crammed away in his memory the minute details of the engine, clutch, transmission, driveshaft, rear and front axle, steering gear, carbureter and electrical and ignition system of every car extant.

Ridiculous as it appears upon analysis, this kink is so thoroughly rooted in the minds of motorists and employers of mechanics that the former are inclined to view askance the workman who has the moral courage to confess that he is a trifle hazy upon some obscure print of construction and to refer to a blue print or car instruction book to refresh his memory or even inform himself regarding something of which he is actually ignorant; while of the latter, there are too many who consider the man who takes advantage of well worked out and clearly written instructive matter, incompetent and fit only for dismissal.

Although flattering to the mechanic, crediting him with an omniscience which he cannot possibly possess, it is also unfair in the extreme and makes for inefficiency which has it direct reflecton in unsatisfactory maintenance service. And who pays? First of all the car owner who is presented with a bill for time, much of which has been wasted by the mechanic who, afraid to admit that he does not know all there is to be known about a particular mechanism and who, motivated by the fear of losing his job or by sheer mulishness, spends hours in dismantling and assembling when a few moments employed in studying a sectional drawing or a diagram would have disclosed how to accomplish the undertaking in one half, one quarter or even one tenth the time.

The second loss falls upon the repair shop owner who, though he may collect for the job, creates a first class grouch in the mind of his patron and makes it certain that when next service is required, a competitor will be given the chance.

Last in the chain of sufferers from this pernicious mental attitude comes the mechanic. He is mentioned last because he has less to lose immediately, but his loss is greater for the reason that he has practised deceit upon himself by pretending to possess a greater knowledge than is his, and by undertaking the job without consulting easily procurable instruction books, conveying the impression of a competency which, as said before, it is unfair to expect of him.

And who is to blame?

All three of the parties in varying degree; the owner, because he fails to realize that the mechanic who is honest enough to admit that he "doesn't know it all" and spends fifteen minutes studying instructions with the certainty that several hours will be saved, is serving his best interests; the shop owner who is so short sighted that he cannot appreciate the workman who has ambition enough to use his brains instead of "bulling" his way through the job; and last of all the mechanic, who is the least culpable, for the reason, that, driven by the motives of fear and self-preservation, he accepts the implied suggestion that he knows and follows the line of least resistance.

And what is to be done about it?

Expect and encourage the mechanic to consult his authorities before starting the job, just as the physician, lawyer, engineer or other professional is expected to do. For instance, when a repair involving the electrical systm is undrtakn, h mchanic should not be compelled to trace out the various complicated circuits with a buzzer and dry cells. True enough, he can do it. Almost anybody can. But why, in the name of common sense, insist that it can be done this way when five minutes' consultation of a reliable wiring diagram will show both ends of a wire, whether others are tapped into it at hidden points, and whether and at which end it should be grounded.

It is truly amazing the amount of time that is criminally wasted in disconnecting, removing and replacing wires—many times wrong—to locate a simple short circuit or ground which could have been remedied in an hour's time if the wiring diagrams, compiled at a cost of hundreds of thousands of dollars, were given just a few moments of study.

Service or Maintenance?

SHOULD the word service be changed to maintenance?

Would it be better and more in keeping with the nature of the work performed in a service station to change the name of the latter to maintenance department or maintenance division?

Service generally makes one think of the performance of labor for the benefit of another, or at another's command. Maintenance means among other things to keep anything, like an automobile or railway, in a state of efficiency. Perhaps the word service has outlived its usefulness with the establishment of better business methods on the part of those whose job it is to see that our cars, trucks and tractors are kept in an efficient state.

A. E. A. Raises $40,000 for Sales Campaign

Association Names Aug. 6 Sales Promotion Day and Aug. 8-13 Sales Promotion Week; Movement Nation-wide

MACKINAC ISLAND, July 8—A sales promotion plan intended to develop more intelligent and vigorous merchandising activities among jobbers, jobber salesmen and dealers and garagemen will be inaugurated by the Automotive Equipment Assn. as a result of its summer convention here this week.

Forty thousand dollars was voted for the movement and a permanent committee was appointed to carry it on, with authority to employ a sales promotion director and necessary assistants.

The association also voted to make Saturday, Aug. 6, Sales Promotion Day and Monday to Saturday, Aug. 8-13, Sales Promotion Week, when jobbers and their salesmen will try to interest retailers in special drives to move stocks of automotive equipment.

Sales Promotion Week is expected to give the new movement a start preliminary to selection by the committee of a director and drafting of detailed plans for a campaign which the association has pledged itself to supply for a year and which is proposed as a permanent work of the A. E. A.

The association hopes, by developing merchandising ability among jobbers and dealers, to broaden the outlet for the products of the automotive equipment industry, stabilizing manufacturing conditions and enlarging the profit-making opportunities of jobbers and dealers.

The association also—

1—Urged dealers to increase sales and profits in automotive equipment lines by paying employees commissions in addition to salaries or wages.

2—Adopted a code of fair trade practices.

3—Authorized appointment of a secretary of committees, this official, with assistants, to be attached to the commissioner's office in Chicago and to relieve standing committees of the detail of their work.

4—Took preliminary steps for making the present part-time freight traffic bureau of the association a permanent, full-time bureau. Final action is likely at annual meeting in November.

5—Favorably received a suggestion for creation of new class of membership for manufacturers' agents. Action is likely in November.

6—Pledged members to exert influence through letters, telegrams and direct appeals by travelers to bring about a reduction in hotel rates.

The jobbers adopted a resolution approving reasonable charges by manufacturers on direct shipments to dealers, where circumstances warrant. Special reference was made to the justice of charges on less than unit package shipments. The manufacturers, in turn, adopted a resolution promising to work toward a reduction of the sizes of unit packages.

It was voted to hold the next spring's convention at Colorado Springs.

The sales promotion plan, details of which are yet to be worked out, contemplates a visualization for jobbers, their salesmen and retailers, of correct and aggressive display, selling and other fundamental elements of automotive equipment, or accessory merchandising. The work probably will be developed section by section throughout the country, with the sales promotion director and his assistants personally presenting the idea to groups of jobbers and their salesmen and the latter carrying it on to their trade. Undoubtedly there will also be literature supporting the personal work of the sales promotion staff.

On the committee were named Robert A. Stranahan, president of the association and president of the Champion Spark Plug Co., Toledo; Howard M. Dine, of Dine-De Wees Co., Canton, O., jobber; N. H. Oliver, of Metal Specialties Co., Chicago; W. D. Lowe, of Lowe Motor Supply Co., Chicago jobber; L. R. Safford, of McQuay-Norris Mfg. Co., St. Louis.

The proposal for the sales promotion movement, made by President Stranahan at the opening meeting Wednesday, created unanimous enthusiasm among both manufacturers and jobbers. The jobbers agreed to get actively behind the work of carrying out the development through their salesmen and retailers.

Funds for the sales promotion work were provided by a draft of $15,000 on the treasury and an assessment of $50 on each member, the latter yielding $25,000. Without a formal vote the members promised an additional $50 each if the aggregate of $40,000 is not sufficient to inaugurate the movement and carry it on for a year.

The convention will hold its annual meeting and business exhibit the week of Nov. 12 in Chicago. An innovation will be a requirement, enforced by the coupon process which compensates delegates for attending meetings, that both manufacturer and jobber delegates spend (the same) two hours a day on the floor of the exhibit. This is expected to result in more satisfactory contact between exhibitors and jobber prospects than has prevailed at previous shows.

With Colorado Springs approved as next spring's meeting place it is probable that the convention will go to the Broadmoor Hotel and the date is likely to be in June.

The convention showed its human side by raising, in about half an hour, a little more than $10,000 to assist the Motor & Accessory Supply Co., of Pueblo, Colo., to get on its feet following a total loss of its stock in the great flood of a few weeks ago.

The supply company, headed by A. V. Faegerstrom, had approximately $25,000 worth of stock on hand when the waters of the Arkansas River swept its building. The A. E. A. headquarters sent out an appeal in his behalf shortly afterward and about $7,000 in cash and merchandise was donated to assist him, in addition to several cancellations of indebtedness on destroyed goods and extensions of credits on new goods made by several manufacturers.

Led by Vice-President Dine, manufacturer and jobber members pledged more than $9,000 in cash and merchandise at the Mackinac meeting and then dropped $746 in bills in a basket, sending the total well beyond $10,000.

Association Expands in Equipment Field

THE Automotive Equipment Assn., at its summer meeting at Mackinac Island, determined to get behind a nation-wide campaign to promote sales of automotive equipment. Forty thousand dollars was raised to finance the movement which will be inaugurated Aug. 6. This day is to be known as Sales Promotion Day, while Aug. 8 to 13 will be known as Sales Promotion Week.

Association goes on record as favoring many improvements in organization work and adding to its activities, such as demanding lower hotel rates, the establishment of new bureaus and the appointment of new secretaries.

The annual convention will be held in Chicago Nov. 12, and the Spring meeting at Colorado Springs, probably in June.

Akron Tire Production Is 75 Per Cent of Peak Output

Big Companies Have Orders Booked to Keep Plants Busy for Three Months

AKRON, O., July 11—A survey of the rubber industry in Akron shows that practically all companies have climbed back to a position averaging 75 per cent of peak production attained in April, 1920. Over 75,000 tires are being manufactured daily and all companies report orders on their books, both from dealers and automobile manufacturers, to keep their factories running at present pace through July and August and possibly September.

Dealers' sales of tires are heavier than they were a year ago, tire manufacturers assert, while automobile manufacturers have sent in heavy original equipment tire specifications for July and August, and also have given notice that they anticipate equally as heavy orders in September.

Goodyear, the largest and the hardest hit of the Akron tire companies during the industrial depression, has been one of the first to stage a spectacular "comeback." Having liquidated its losses through refinancing involving $88,000,000, and through re-organization of the entire company, Goodyear has experienced a steady climb back to a position closely approaching normal, and with the addition of 3,000 men during the past two weeks, now is operating on a basis of 86 per cent of peak production.

Sales Steadily Increasing

Goodyear's peak was 31,181 tires daily, obtained in April, 1920. Today the Goodyear factories in Akron and Los Angeles are making a total of 26,700 casings daily and 30,500 tubes daily, and are running on a basis of three eight-hour shifts daily, and six full days of operation a week, with approximately 11,000 men employed. The company reports dealers' sales steadily climbing, and far in excess of dealers' sales for the corresponding weeks of last year, and also reports that automobile manufacturers have placed heavy July and August orders for original equipment.

That the Goodyear factories will continue to operate on the present basis, and may possibly increase production within the next two months, is freely predicted by officials of the company.

The Firestone Tire & Rubber Co. is operating on a basis of more than 70 per cent of peak production which was 28,000 tires a day, attained in April, 1920. Firestone has lengthened its two daily shifts to nine hours each and is operating on a production basis of 20,000 casings and 23,000 tubes daily.

The B. F. Goodrich Co. has not materially increased production within the past few weeks, continuing on a basis of about 15,000 casings and 16,000 tubes daily. Smaller Akron companies are operating close to normal.

Every Akron tire company reports a much higher degree of efficiency among factory operatives, than a year ago when abnormal wages were paid tire builders and when Akron was in the throes of prosperity and wanton extravagance. Whereas the factories previously averaged about a tire a man per day, they are now showing more than a tire and a half per man in many departments, while the general average of increased efficiency, as reflected in production records, will exceed 40 per cent. Workmanship is better, factory managers report, and in re-employing men a higher grade of workmanship has been gained in general.

Labor tunover today is almost nil in Akron. A year ago when jobs were plentiful, when several Akron factories enforced a daily minimum factory wage, and when every rubber company was calling for men, the labor turnover in some instances reached a mark in excess of 30 per cent. But today, manufacturers state, conditions are in sharp contrast, and labor turnover has been reduced until it has become negligible, through each factory operative's desire to hold onto his job as long as possible. The weeding process also employed in practically all factories, has conduced greater individual and collective efficiency. Rubber companies which have put on men in blocks of several hundred or a thousand, have picked them carefully from the many applicants, and at the same time have used many of them to replace indifferent and careless workmen in tire building departments.

With wages reduced as compared to last year, it is estimated that the rubber companies today are gaining greater production per man at a gross of over 50 per cent less labor cost.

Tractor Tests Unfavorable To Horse in Indianapolis

Indianapolis, July 11—The small tractor is assuming a new role in this city. The use of tractors is believed to be one method of getting the city out of a serious predicament. At the present time the board of sanitary engineers uses mules and horses in the ash and garbage collection departments. In casting about for a place to house all the animals the board found a suitable location in West Indianapolis, a part of the corporate city.

Citizens of that section have protested to the point of beginning legal proceedings to dis-annex the entire section from the city, thus forestalling any municipal barns in the section. As a result, the board is conducting a series of experiments with small tractors, which if successful probably will mean the elimination of every horse and mule from the department. Officials of the sanitary commission say the experiments so far have been satisfactory and it is likely that within 90 days the entire department will be motorized.

Racers Favor Reduction In Piston Displacement

Drivers Think Ruling of Indianapolis Speedway Officials Will Benefit Automotive Industry

INDIANAPOLIS, July 11—Race drivers in Indianapolis are unanimously in favor of the new ruling of officials of the Indianapolis motor speedway to the effect that in 1923 cars entering for the 500-mile race will have to keep the piston displacement at 122 cu. in. as a maximum. The displacement in European cars would mean two litres. Howdy Wilcox stated today that it was his belief the action on the part of the Indianapolis race course officials would aid materially in developing the motor industry in this country. Louis Chevrolet, who designed two successive winners on the local course, also is in favor of the smaller displacement. Officials of the Duesenberg, while interested in the announcement, said that because they expected to retire from racing, they were not sufficiently interested to make any special experiments from a racing standpoint.

With the announcement of the reduction in displacement, Jean Chassagne, who was in the Ballot plant in France for some time and is said to be familiar with the creations contemplated and experiments tried, declares that before two years have passed the smaller engines will be making the speed the larger engines do. He said two two-litre cars now were being perfected in the Ballot factory and road trials prior to the Grand Prix in Le Mans showed them to make 95 miles. He believes that in another year the company will have perfected an engine that will compare in speed with those of larger displacements.

Howdy Wilcox is enthusiastic over the change. He said today that while the races might be uncertain the first year, yet some startling surprises would be recorded with the smaller engine. He, like the others, believed the second year would see the small engine on a par with the larger one. He is expecting a reduction of weights also. At the present time the minimum is about 1650 pounds and he expects this to be reduced to about 1400 pounds. He says the small engine will produce as much speed eventually and the lighter car will enable the drivers to make some wonderful showings.

This is the fifth time that the Indianapolis track has reduced the engine sizes.

13,759 BUICKS SOLD IN JUNE

Flint, July 10—Figures that reflect the strength and potentiality of the United States and one of its greatest industries were offered recently by the Buick Motor Co. They show that during the month of June just past, 13,759 Buick automobiles were delivered into the hands of owners. All these cars were six-cylinder models, ranging in price from $1495 to $2635.

Five Famine Years Make Dealers in North Dakota

Have Learned How to Live and Carry On Business Under Hardest Training—Necessity

(*Concluded from page 9*)

be two essentials in his life. He must not be sold too large a truck. From 1-ton to 1½ or 2 ton at the most would seem enough.

He may want more, but tear a page from the experience of the eastern farmer who has found that a 1½ ton job is a better investment than a 3-ton job. The small pneumatic tire not over five inches has advantages on the country roads over seven and eight inch sizes, where the sides are worn out too quickly in the hard ruts.

Sales of isolated house lighting plants have been slow in the past year and have almost completely ceased this month, and Mr. Ashleman, Delco light distributor for North Dakota, has recently disposed of his electrical equipment business such as chandeliers, coffee percolators, bulbs, flat irons, etc., that go with the Delco unit, due to merchandising problems; in fact, the Delco policy has been recently altered in this regard. For a time the sale of this equipment to the farmer was looked upon as a big part of the business. Difficulties developed, the regular electrical supply dealer of the town, who a few years ago did not have any realization of this new industry, has seen the possibilities in this business and has resented the sale of equipment by the Delco or other dealer.

Then, too, the distributor has had the problem of financing his dealers to a large extent in this equipment field. The dealer can now concentrate on the sale of the lighting plant and a few major equipments such as pumps, washing machines, etc.

General Conditions in Summary

Service on these isolated lighting units has been a problem, and Willys Light, who formerly gave service for one year, has reduced the service period to 90 days, after which time the farmer pays at an hourly rate. Some Willys Light dealers are discontinuing the sale of miscellaneous equipment and concentrating on the lighting unit. Not all dealers are giving service.

In several areas Delco dealers do not give service and operate on a lower sales discount basis, service in such areas centering in one large dealer organization fitted to serve the entire territory. The sale of lighting outfits through hardware stores is waning. Many garagemen and car dealers make good salesmen and the garagemen are especially well fitted to give service.

General conditions in four of the leading towns of North Dakota may be summarized as follows:

Fargo, in rich Red River Valley area. Car sales 20 to 50 per cent of last year; Fords not included. Price reductions greatly aided sales which are nearly all in the city, with few in the country. Western part of Fargo territory has had crop failures for two or three years. Over one dozen Fargo dealers, several curbstone ones, have gone out of business in the last year. Fifty to eighty per cent of sales in Fargo are on time payment.

J. D. Grant, accessory jobber, reports accessories selling well in eastern half of state and western Minnesota. He has five traveling men instead of seven. Payments are 90 days, formerly 30 days. The eastern part of state is sound but hard up. Over 80 per cent of farmers have motor cars.

Grand Forks. City business is good; no business in country. Farmers are doing their own repairing. Studebaker sales are 85 per cent of last year; Ford sales slightly under last year, but parts sales 100 per cent. Several new repairshops have started. No truck sales are made, and many large tractors not used this year. Price reductions greatly stimulated sales. Dodge and Buick have few substations out of business. No distributors are out of business.

Devils Lake. Ford sales practically equal last year's; no truck sales; tractors slow. Farmers are doing most of their own repairing. Studebaker sales in the city are good. Local banks are sound financially. General business in Devils Lake is 50 per cent. Farmers are just starting to buy trucks. Several dealers sell tractors along with cars, tires, etc. Farmers in the country are wealthy and own their land. Nearly 100 per cent of farmers have motor cars.

Minot. Crop conditions in radius of 10 miles are poor. Crops burned last week. Thirty-eight banks failed in this territory. Not a good crop has been raised for five years. There are few tractor or farm implement sales—no truck sales—though more car sales after price reductions than for eight months previously. Repair business good until July 1st when slack set in. Few sub-dealers are out of business. Firms that sold 20 trucks last year have sold but one this year. Ford sales in cities and towns ahead of last year. No cars laid up. Repair business are largely on cash basis.

FOX CAR OUT THIS FALL

Philadelphia, July 8—The factory of the Fox Motor Car Co., of this city comprising 100,000 feet of floor space has been completed and its product, the Fox air-cooled car, is expected to make its appearance this fall.

The plant is owned by car owners of which there are more than 3,000 on the stock books of the company. The five-passenger touring car will be sold for $3,500. Other body types will comprise a roadster, coupe and sedan.

State Automotive Trade Ass'n. Shapes Many Laws

As Result of Bureau Maintained at Springfield Measures Get Careful Consideration

SPRINGFIELD, Ill., July 9—The value of the Illinois State Automotive Trade Ass'n. was never better illustrated than during the recent session of the legislature. An active bureau was maintained and effective work was performed in behalf of the dealers in guarding against deleterious legislation and encouraging that which was favorable to the men engaged in the automotive industry.

Perhaps the greatest triumph was that in relation to licenses for dealers. The proposed bill was so amended as to save Illinois dealers more than $100,000, affecting primarily the smaller concerns. But for this watchfulness at Springfield, the bill, as first proposed, would have been adopted.

The throttling of the additional tax upon gasoline was also a noteworthy victory. This measure appeared certain of passage. The state association wired all of the local associations to get busy and see all representatives and senators and also send protesting messages. This was done and the pressure became so strong that the bill was killed. For this action, every person in the state using gasoline has cause to be grateful to the dealers' association, operating in conjunction with the state automobile association. Many other measures which were objectionable and extremely damaging to the automotive industry were successfully opposed and killed in the committee room. Others which were desired were rescued from death and worked through both houses and brought to the attention of the governor.

Three A Sanctions Races at Cotati Speedway Opening

San Francisco, July 8 — Sunday, Aug. 14, has been selected as the date of the opening of the big speedway now under construction at Cotati. Officials of the Sonoma county racing saucer have received the official "three-A" sanction for the August date, and the northern California auto-speed fan will then have his first opportunity to see the world's fastest drivers in action in this part of the country. Work on the saucer is being rushed to completion, and there is every indication that it will be ready for the preliminary speed trials on July 10.

Reports indicate that Jack Prince will live up to his advance notices, and give northern California one of the fastest, if not the fastest automobile track in the country. A stock car event will be one of the features of the Aug. 14 program, and several of the entrants in the Nevada 1,000-mile road race at Reno, July 1, will be in the Cotati speed event.

Automobile Business Is Better Than Many Think

Early Season Foolish Optimism Gave Way to Needless Pessimism; Sales Are Good

By JAMES C. DALTON

NEW YORK, July 11—There are two outstanding facts about the status of automotive industry as the middle of July approaches:

Business is considerably better than many persons within the industry think it is.

Business is very much better than people in general outside the industry think it is.

Governor Harding recently told the members of the National Automobile Chamber of Commerce that the worst thing about a pessimist was that he usually was pessimistic at the wrong time. That applies to a lot of men in the trade at this juncture.

The impression seems to be almost universal among those who have not followed the situation carefully that the automobile trade is suffering from a bad case of the doldrums. The Guaranty Trust Co., for example, the second biggest bank in the United States, in its survey of general conditions for June, has this to say:

Demand for Automobiles Declines

"A decline in the demand for automobiles, accompanied by numerous recessions in prices is reported. The slackening of demand is affecting both truck and passenger car output. About one-third of the companies actively engaged in the production of passenger automobiles in the United States have revised prices downward since April. The recessions in prices have been proportionately larger for the lower-priced cars than for those selling at higher prices.

"A reduction in the demand for automobile tires, corresponding in a measure to the lessened demand for automobiles, has affected the activity of a number of rubber companies. In accordance with curtailment of production schedules, workmen have been laid off.

"Earlier in the year there was a considerable increase of business in the automobile and tire industries, an increase which resulted in exaggerated expectations concerning the immediate future of these industries."

This summary could not have been much further from the actual facts in relation to June. There was a falling off in sales at retail the latter half of May but it was not reflected in the factories. Sales in June were larger than for any month of the year thus far and it was one of the largest Junes in history. There has been no reduction in demand for tires and all the large factories increased their production schedules last month.

"Earlier in the year" there may have been some "exaggerated expectations" concerning the future, but they were not shared by well informed men in the industry. On the contrary, actual conditions have warranted greater optimism than was felt in most quarters.

It undoubtedly is true that there would have been a slump in sales if prices had not been reduced. They were lowered, however, and a flood of orders followed. This demonstrated beyond quibble that there is not a dearth of automobile buying power.

While it is certain there would have been a slump in sales if prices had not been reduced, it is equally certain that there will be a slump unless prices are stabilized in the very near future. No person to whom money is an object is going to buy an automobile unless he has some assurance that he can't get it $150 or $200 cheaper a month from now.

Two well known companies in the same class have reduced their prices twice in a month. The first company to reduce felt an immediate stimulus in its business. The sales of the second stopped. Then the second company reduced but still sales didn't start and it made a second cut. Then the sales of the first company slowed up and it made a second cut.

Continual Price-Cuts Disastrous

There were many reasons why automobile prices should have been reduced, but there is every reason in the world why they should not be lowered every two weeks. Such a price war would be ruinous. It would do more than anything else possibly could to check sales. When a man buys even a pair of shoes anl then finds that he could have bought them $1 or $2 cheaper a week later he instinctively feels that some one has made a fool of him and this engenders a certain amount of animosity towards the maker or dealer. If he loses $100 or $200 in another kind of purchase his disgust is multiplied accordingly.

Dog days usually are dull in a business way but this year they will afford the tired business man and manufacturer an excellent opportunity to scan the industrial horizon and figure out intelligently what's going to happen two or three months from now.

The signs are on the horizon now and it doesn't require superhuman intelligence to read them. The favorable omens greatly outnumber the portents of evil. The fundamentals upon which business and trade rest are stronger than they have been in 18 months. They point to a gradual but none the less certain business revival in September or October at latest.

There was foolish optimism a year ago and there is needless pessimism now.

WHITE GETS BIG ORDER

Portland, Ore., July 12—What is one of the largest sales of motor trucks on the Pacific coast has just been made by the White Co. in providing 46 White trucks to the American Railway Express for immediate delivery in Los Angeles, Portland, Seattle and San Francisco territories.

Cotton Fabric Contracts Are Snarl in Rubber World

Big Companies Slowly Liquidating; Cancellations Have Been Avoided; Small Builders Not Affected

AKRON, July 11—Considerable progress is being made by the larger tire companies in liquidating contracts for fabric which have been hanging fire for several months. Goodyear, which had contracts for 60,000,000 yards of fabric, has taken delivery of approximately 10 per cent. Firestone is rapidly reducing its commitments and recently was compelled to refuse orders for certain grades of tires because they could not obtain sufficient fabric in time. Goodrich is taking delivery more slowly than the other large companies and does not expect to liquidate present contracts before 1922.

Various expedients have been adopted by tire companies to ease the burden of high priced fabric contracts inasmuch as there have been no cancellations. In some cases deliveries have been taken for 25 to 50 per cent of the contract at the original quotation and the remainder at the market price. Other companies are taking goods at the market price to be paid for on the usual terms and are giving long term notes on the difference due on high priced contracts. Some companies are understood to be buying cheap fabric in the open market to average costs.

Smaller tire companies which did not have large commitments either for crude rubber or fabric because they lacked the financial resources of the larger factories are in a much better position in regard to supplies and are taking advantage of the low prices on both these materials.

ST. LOUIS LICENSES INCREASE

St. Louis, July 8—J. E. Johnston, supervisor of the St. Louis license office, reports that 68,700 state licenses have been issued to date, whereas only 64,517 were issued for 1920. With six months before the year will expire, Johnston estimates the total of automobile licenses will reach 85,000.

Oliver Chapman, city collector of licenses, also reports an increase in the number of city certificates. The total for last year was 47,154 but between February last and June 22 he issued 52,609. He has ordered 55,000 plates.

Chauffeurs' and motorcycle licenses have not exceeded the mark reached last year but by the time the fiscal year is completed, an increase is expected to become apparent.

The increase in motor vehicles is noticeable throughout the state Figures for the period up to June 22 are not available at the local office as yet, but it is estimated that 50,000 more licenses will be issued this year than the 300,000 last year.

Increased Sales In Ohio Follow Price Reductions

Burned Out Wheat Crop Dulls Hoped for Revival of Farmer Trade

COLUMBUS, O., July 12—There is quite a noticeable increase in sales with the passenger car dealers of Columbus and central Ohio since the price readjustments have taken place. Apparently the public was waiting for the reductions in price and with the announcements late in May and early in June, buying which had been held up for some time was started anew. As a result, nearly all of the local agents and jobbers have been having a much better volume of business with prospects for the remainder of the summer extremely good.

The worst feature of the trade is the slowness still shown in the farming communities. Farmers are not having a good season as far as the wheat crop is concerned, which together with low prices is curtailing their purchasing power. This is shown in the smaller number of orders received for automobiles.

Truck dealers are still having a slow business and little improvement is expected for the time being. Mercantile establishments are not disposed to increase their business equipment under existing conditions and consequently they are playing a waiting game as far as the purchase of trucks is concerned. Commission men and wholesale grocers are probably the best prospects at this time and some trucks are being absorbed in those lines of industry. Haulage firms have sufficient equipment, when the shrinkage in business is considered, and they are not in the market to any extent. With the revival of business which is confidently expected in the fall a better demand for trucks is anticipated.

The repair business at the various shops and public stations in the Buckeye capital is fairly good. Owners are coming in with their cars for minor repairs but are postponing the general overhauling. Parts business is quite good according to local agents.

GUARANTEE MACK PRICES 90 DAYS

New York, July 11—The International Motor Truck Corp., manufacturers of Mack trucks, has decided to give a running guaranty of 90 days to both dealers and purchasers against price reductions. No time limit has been set upon the period during which this guaranty will be given but it can be revoked by the company at any time. All purchasers of trucks in the meantime will be guaranteed against lower prices for 90 days after the date of delivery.

ROAD SITUATION PLEASES BUCKEYES

Columbus, July 12—An amendment to a bill pending in Congress, giving Ohio five years to match dollar for dollar the $4,800,000 set aside for Federal aid to road improvement in the Buckeye state, is hailed with joy by good roads enthusiasts in the state. It has been found impossible for Ohio to meet the requirements of the former ruling when the appropriation was originally made and consequently the amendment was prepared. The house has passed the amendment and it now awaits action in the senate.

As three-fourths of all state road funds go to building inter-county roads it was not possible to tax the people enough to match the Federal appropriation dollar for dollar. Under the new ruling, if agreed to it will require only $1,200,000 for Ohio to furnish to meet the 1921 appropriation.

BIG SHOW AT BERKELEY

Berkeley, Calif., July 8—The majority of the automobile dealers of Berkeley, will have exhibits in the Merchants' Fair, to be held here in August. There will be 150 exhibits, all housed in a huge, specially constructed tent, covering a space equal to about four city blocks in area.

ALABAMA DEALERS TO MEET

Birmingham, Ala., July 12—Arrangements for the semi-annual meeting of the Alabama Auto Dealers Assn., to be held in Coden, Ala., on July 25-26-27, are being completed.

The program provides for a three-day convention, during which problems of the members will be discussed. Two days of the time will be devoted to business while the third will be taken up with an all-day barbecue, picnic and outing on Mississippi sound.

Alabama's good roads program will be one of the principal subjects of discussion during the meeting. Members of the association are of the opinion that action urging the legislature of the state to meet in special session and take definite steps on the $25,000,000 road bond issue will be taken.

New York Bidders Timid at Reconstruction Truck Sale

Offer $900 for 3½-Ton Packard With 30-Day Guarantee Against Defective Parts

NEW YORK, July 11—Lack of interest was the most striking feature of the three-day auction sale here of reconditioned American-made army trucks brought back from England by the Truck Co. of America. There was light bidding because of the small attendance which did not exceed 50 the last day. Only 90 of the 200 trucks offered were put on sale.

General business conditions in the truck transportation field, were blamed for the lack of demand. During normal times there would have been little hesitancy on the part of buyers. One man in attendance stated that while he considered the trucks good purchases, he could not afford to add to his fleet when many of his vehicles were already idle.

Though the vehicles were in good condition and considered bargains, those wishing to buy were reluctant to bid much above $1,500 for any of the trucks. The sale included 5½-ton Macks, 5-ton Pierce-Arrows, 3½-ton Packards, 3-ton Whites, 4-ton Rikers and 1½-ton Commerce.

Because of the light bidding, the auctioneer was forced many times to reject the bids. The last day $900 was the highest bid for one of the Packards. Some of the trucks were said to have been sold for around $2,500.

In one particular instance, the auctioneer led the prospective buyers to believe that the trucks carried a manufacturer's guarantee. This was not so, the only guarantee being one against defective parts within 30 days of purchase.

Engine Displacement of 122 Cu. In. to Rule Indianapolis Races in 1923

INDIANAPOLIS, July 19—T. E. Myers, secretary and manager of the Indianapolis Motor Speedway Co., has announced that the 1923 race on the famous track would be for cars powered with engines having a maximum piston displacement of 122 cu. in. Translated into European terms this is two litres. The 1922 500-mile race, the tenth annual event, will be for three litre cars, or engines of 183 cu. in., the same size as the 1920 and 1921 races.

This is the fifth time that the Indianapolis track has reduced the engine sizes for the cars competing in the five-century, which is the classic of all the world's speed events annually. Off hand, such reductions would seem to reduce the speed of the cars. Such is not the case. The automotive engineers have always been able to obtain more speed by speeding up the engines and lengthening their stroke, which is to say, that the diameter of the cylinders is reduced.

The 1923 race will have engines smaller than anything now built in America. The smallest engined car today in production is a four-cylinder, measuring 143.1. The Ford engine is near the 183 maximum. Such reductions have always been reflected in the stock production of the American makers. The "crucible of racing" has proved to the satisfaction of the engineers that fuel economy could be effected by reducing the engine sizes. In the last race the average car's mileage was 10 miles to the gallon. Two years hence it should pass the 12-mile mark.

The efficiency of the two-litre engine was demonstrated recently in the French economy Grand Prix, at Le Mans, where De Dion Bouton, of this class, showed 49.09 miles to the gallon in a stock test.

Other than the announcement of the engine limitations, no specifications have been made public.

Flood of Used Cars Gives Pause to Southern Dealers

Warehouses Are Filled With Trade-Ins For Which There Is Slow Sale

BIRMINGHAM, Ala., July 10—Local automobile dealers are stocked up with used cars and announce that they will solicit no more trades where a second hand car is involved, although they do not expect to refuse a good trade just because a used car is offered.

"The barometer of the automobile business in Birmingham is the number of used cars which are now flooding the market and which dealers must dispose of in order to make the business "ends meet," said Sterling Edwards of the Edwards Motor Car Co., agents for the Chevrolet car. "Our company has done a lot of business during the past month, but so much of the money taken in is tied up in old cars, which must be disposed of, that it is slow in liquidating."

His sentiments were echoed by dozens of other dealers in the district, who declared that until the cars begin selling, no more trades involving used cars would be solicited. Every storeroom belonging to an automobile dealer in the city is stocked with them.

"Some method of moving the large stock we are accumulating must be hit upon in the near future," said Mr. Edwards. "A co-operative campaign among the dealers of the city may be inaugurated, although no plans have been made so far. Until they begin a normal outgo as well as the normal turn-in, business conditions for automobile dealers cannot be called first rate."

The class of people who are buying cars, according to Donald Drennen of the Birmingham Motor Co., are the ones who have not bought them since before the war—the people who have a fixed income which is increasing in buying power as prices decline.

Cash settlements for expensive cars are not nearly so numerous in the new business spurt as they were before the depression, but the purchasers are of the substantial, dependable class whose trade is as good as cash.

With the renewal of activity in the lumber business and all other building material lines in Birmingham, the sales of trucks have shown a marked increase.

The demand for new trucks increased during the month of June so rapidly that all orders placed by local building material dealers could not be filled on schedule time.

In fact, business in every line of the automotive industry is good, according to local representatives of agencies, repair shops and supply houses.

FORDNEY CHAMPIONS TRUCKS

Washington, July 9—Chairman Fordney of the House Ways and Means Committe says that Section 317 of the permanent tariff bill fully covers the question of the reimportation of trucks.

Section 317 of the tariff bill is very clear on the suject of reimportations, reading in full as follows:

"That upon the reimportation of articles once exported, of the growth, product, or manufacture of the United States upon which no internal tax has been assessed or paid, or upon which such tax has been paid and refunded by allowance or drawback, there shall be levied, collected, and paid a duty equal to the tax imposed by the Internal revenue laws upon such articles, except articles manufactured in bonded warehouses and exported pursuant to law, which shall be subject to the same rate of duty as if originally imported; but proof of the identity of such articles shall be made under general regulation to be prescribed by Secretary of Treasury."

If this item is included in the permanent tariff when finally enacted it will put an end to underselling of American truck dealers by foreigners. It was at the insistance of the N. A. C. C. and the agitation in Class Journal publications that brought this favorable action from the Ways and Means Committee. Because of delay incident to debate on the tariff bill the Graham resolution may be rushed through the House and Senate.

SEVENTH TOUR STARTS

Detroit, July 9—The seventh annual good roads tour of the Michigan Pikes Ass'n. Inc., left here today for a fifteen and one-half-day intense campaign for better highways and the popularization of through tour routes in the Great Lakes district.

The tour is international for the second time, its most northern terminii being the Canadian Twin Port, Fort William and Port Arthur. It is known as the "Around Lake Superior" tour. It will traverse the Lower Michigan Peninsula from south to north, the Upper Peninsula of the Wolverine state, from east to west; skirt the southern shore of Lake Superior, through northern Wisconsin; follow the north shore of Superior from Duluth, through Minnesota and Ontario; then south through Michigan to Detroit. Forty cars and trucks and approximately 200 tourists accompanied the motorcade.

WILLYS EXCEEDS JUNE SCHEDULE

Toledo, July 10—With a big drive through to the last day of June the Willys-Overland plant went 37 cars over its schedule for the month for a total production of 8,537 cars. On June 2 the schedule was fixed at 3,500 but the increased volume of sales caused this to be boosted to 8,500 for the month.

The July production will be increased 50 per cent and according to appearances August will be a busy month at the plant. Some departments at the factory have been forced to put on three eight-hour shifts this month.

June was the first real test of the new production system put into effect by Vice-Presidents Walter Chrystler and Charles B. Wilson.

Two Factory Heads Predict Big Sales Throughout 1921

Jordan and Chandler Do Not Expect Dull Period Even During July and August

CLEVELAND, July 9—The Jordan motor plant has been operating at capacity for the last three months, with cars selling easily, and the plant is to be operated during July at capacity, according to an announcement made by Edward S. Jordan, president.

The production during June was the heaviest in the history of the corporation, which has been producing automobiles five years. The number of cars delivered to distributors ranged from 160 to 180 weekly. The record for the month of June was 705 cars. The plant is employing 100 per cent of its operatives.

Notwithstanding the fact that July and August are regarded as normal dull months, the management has made all arrangements to continue the present rate of production throughout July. If there is any reduction in orders during the month, the management stated it does not under any conditions expect a loss of greater than 15 per cent under the record for June.

Mr. Jordan placed the credit for the record of sales on the price reduction, which brought in a great flood of orders. He and Frank C. Chandler of the Chandler Motor Corp. predict a gradual increase in business the last half of the year. They point to the settlements of many strikes that had a demoralizing effect during the first six months of the year.

Ninety-nine employers of labor, all of them producers, on June 30 were employing 10.8 per cent less workers than on May 30.

Automobile plants of the city showed a loss of 22.7 per cent in the number of employees since May 30; automobile parts a loss of 10.1 per cent; iron and steel plants in this city, other than the branch of the United States Steel Corp. suffered the heaviest slump of any industry. The lass in employees in the last thirty days was 29.4 per cent. Fourteen miscellaneous plants, principally electrical concerns, reported an increase of 10.5 per cent.

30 AIRPLANES GUARD FORESTS

Sacramento, Cal., July 8—Air patrol of the forests of California, Oregon and Washington, on a larger scale than ever before attempted, was commenced July 1, when 30 airplanes started continuous patrol duty with Mather Field as a base, and five more went out from March Field.

All the forests of the three states have been zoned and mapped for the air patrol, and it is believed that the number and extent of forest fires will be reduced considerably this year as a result.

Number of Unemployed in June Is Less Than in May

Optimism Prevails But Impression Is That Marked Improvement Will Delay Until 1922

WASHINGTON, July 12—Analysis of employment conditions after an industrial survey by the Federal Employment Service shows a slight decrease in the number of workers employed in the automobile industry during June. Agents of the United States Employment Service at Detroit reported, "though the reduction of automobile prices has temporarily stimulated sales, the impression prevails that marked improvement will not begin before 1922." The automobile plants at Flint and Lansing, Mich., are fairly busy. In Indiana, however, automobile manufacturers are enjoying increased production. In Ohio employment in automobile establishments and allied lines has improved. With slight exceptions, business in auto parts and accessories in Wisconsin has fallen off.

According to the Federal Employment Service, "Detailed examination of the present returns indicates clearly the fundamental causes of the protracted industrial depression and the mounting tide of unemployment. Continued unsatisfactory conditions of transportation, with freight rates in many instances considered almost prohibitive; lack of anything like a normal foreign market; the preent low value of farm products; stagnation in iron and steel; high costs of construction; and general dullness of the retail trade stand out prominently as leading factors in the situation. Industry generally is optimistic, and while the likelihood of a dull summer in most lines is fully recognized, the tendency is to count on improvement by fall, and a healthy though not spectacular business revival by the spring of 1922."

BARKER NAMES CO-WORKERS

Detroit, July 10—Arthur E. Barker, vice-president and general sales manager of the Maxwell Motor Corp., has appointed John L. Plath as director of sales of the Maxwell Motor Sales Corp. and E. W. Clark as director of sales of the Chalmers Motor Car Co.

Mr. Plath's connection with the Maxwell companies dates back to 1913. Starting in as district supervisor, he was soon placed in an executive position, became assistant director of sales, and has held that post up to his recent promotion.

Mr. Clark's service with the Maxwell and Chalmers companies also extends over a number of years. While he has served as assistant treasurer for some time, his original work with the company was entirely in the development of territory and promotion of sales.

CITES TIRE COMPANY AS UNFAIR

Washington, July 12—Issuance of a complaint against the Diamond Holfast Rubber Co. of Atlanta has been announced by the Federal Trade Commission on allegation of unfair competition. It is claimed that this company marketed its products in such a way as to pass them off as the products of the Diamond Rubber Co., a subsidiary of the Goodrich Rubber Co. It is further alleged that the respondent sold its products in containers with labels which featured the word "Diamond" and so closely resembled the labels of its competitor, the Diamond Rubber Company in typographical arrangement, color scheme and general appearance, as to cause confusion in the trade. The Commission has allowed the company 30 days to file an answer.

WOLVERINE TRUCKS LOWER

Detroit, July 9—In conjunction with the announcement of a new line of trucks, the American Commercial Car Co., manufacturers of the Wolverine truck, has reduced prices on the entire line from $50 to $115. The new line will take the place of the former models, and while substantially the same, will embrace new and distinctive features.

The new prices are 1-ton, $2125, formerly $2240; 1½-ton, $2375, was 2465; 2-ton, $2640, was $2650; 2½-ton, $3425, was $3475; and 3½-ton, $4100, was $4150.

HENDERSON PRICES REDUCED

Chicago, July 9—The Excelsior Motor Manufacturing & Supply Co. names new prices on Henderson and Excelsior motorcycles. The electric equipped Excelsior is reduced from $480 to $400 and the electric equipped 4-cylinder Henderson from $585 to $485.

ELKHART MAKES SECOND REDUCTION

Elkhart, Ind., July 10—Effective July 1 reductions of from $100 to $200 were made on all the 16 models of the Elkhart car. This is the second reduction on the Elkhart, the first one having been made April 1. The new prices f. o. b. factory, as compared with the old are as follows:

	Old	New
5-pass. tour, 4-cyl	$1395	$1195
5-pass. tour., Standard 6	1495	1385
5-pass. tour., De Luxe 6	1795	1595
4-pass. sport, 4-cyl	1395	1195
4-pass. sport, Standard 6	1495	1385
4-pass. sport, De Luxe 6	1795	1595
3-pass. road., 4-cyl	1395	1195
3-pass. road., Standard 6	1495	1395
3-pass. road., De Luxe 6	1795	1595
3-pass. coupe, 4-cyl	1795	1595
3-pass. coupe, Standard 6	.....	1735
3-pass. coupe, De Luxe 6	2495	2395
4-pass. suburban 6	.....	2495
5-pass. sedan, 4-cyl	1895	1695
5-pass. sedan, Standard 6	.....	1895
5-pass. sedan, De Luxe 6	2635	2495

OAKLAND LOWERS PRICES AGAIN

Detroit, July 10—Prices on the Oakland roadster and the coupe and sedan have been reduced again by the Oakland Motor Car Co. today, the reduction being the second since May. The new roadster price is $1095, a reduction from $1145. The coupe is priced at $1626 and the sedan at $1725, both formerly being $1815. The touring car which was placed at $1145 in the May reduction remains at that price.

Babson Predicts Coal For Fuel; Cotton For Bodies

Economist Says Tendency in Automobile Building is Toward Lighter Models

TOLEDO, July 11—Roger Babson, economist, who has been making a personal survey of the automotive industry, recently spoke before a gathering of business men in this city. In the course of his remarks Mr. Babson said that the current in automobile channels was toward lighter models than are now being manufactured.

He pointed to the two lines of experiment that were fundamental to the automotive industry, in his opinion. One was the use of bituminous coal dust for fuel and the other was the development of cottonoid and paperoid bodies for lighter construction.

"I happen to be conversant with experiments now being made by several automobile manufacturers in the use of bituminous coal dust as fuel for automobiles instead of gasoline," said Mr. Babson, "and the result of the experiments so far indicates that within a few years gasoline at high prices will no longer be used as motive power for automobiles.

"The coal dust will be blown into the carbureter of the car and burn with sufficient intensity to provide all the heat and power necessary for the operation of the machine.

"Fifty cents' worth of coal dust thus utilized will carry a car the same distance that five dollars' worth of gasoline now carries it. This decrease in the cost of operating an automobile will greatly increase the use of automobiles.

Cottonoid or Paperoid Used in Bodies

"I have witnessed experiments with cars whose bodies are made of a combination of formaldehyde, glue and cotton, a material that has come to be known as cottonoid. Similar material may be made out of paper as one of the three ingredients, so to speak, instead of cotton.

"So we are to have automobiles with cottonoid or paperoid bodies, making the car much lighter, and more durable and cheaper.

"I saw an experiment made with a car that had a cottonoid fender. The car was made to collide head on with a brick wall. The cottonoid fender gave in like rubber and rebounded the car like a rubber ball. Such a fender does not break or bend like steel, but has resiliency and sufficient strength to protect the machine in collision.

CHAMPION PRICES DOWN

Phidalephia, July 10—The Champion Motors Corp. announces reductions in the prices of its various models. The special touring car is reduced from $1595 to $1395; the Champion "tourist" from $1250 to $1095 and the commercial car to $1425.

Lincoln Car Wins 1000-Mile Race Over Nevada Desert

Bramlette, Driver of the Winner, Makes Average of 35 Miles an Hour for 1015 Miles

RENO, Nev., July 10—W. W. Bramlette, driving a Lincoln, won the 1000-mile, three-day road race over the deserts of Nevada, which finished here July 1. Bramlette made the 1015 actual miles of the course in 29 hrs. 49 min. 49 sec., an average close to 35 m. p. h. for the race.

The final lap of the race was the most thrilling of the entire contest. An immense crowd gathered for the finish at the race track here, and waited hours for the appearance of the first car to finish. When it came out of the dust cloud, it proved to be the Buick piloted by Joe Nikrent with his brother Fred as mechanician.

Nineteen minutes after the Buick checked across the finish line, Bramlette in his Lincoln came tearing in, winner of the road race. Then there was a long delay for the third in, George Harrison, driving an Essex. His car had jumped the road into a ditch while doing fifty miles an hour near Carson City and a crew from Reno had to be sent out to put him to rights. Even after that, however, Harrison managed to finish second when the elapsed times were figured out, and third in the actual crossing of the finish line. Though Bramlette had tire trouble shortly after leaving Minden on the morning of July 1, his victory was decisive.

Nikrent Brothers Take Lead

Leaving the start on the morning of the first, ten minutes behind the Lincoln, and rather less behind the Essex, the Nikrent brothers in the Buick, by setting a pace average of 50 miles an hour, managed to overtake both the others near Yerington. From that point to the finish here in Reno, the Buick kept the lead, making up much of the time lost in the desert on the preceding day when the Buick was thrown into third place due to the breaking of a wheel.

In an effort to keep the pace set by the Buick and to make up the time the Lincoln had gained the preceding day, Harrison stepped on the gas in the Essex and went into the ditch, though neither he nor his mechanician, Ed White was injured.

Joe Nikrent, veteran of many long road races, said he had never seen worse roads, nor driven through so hard a grind on a long-distance race.

This is the first annual Nevada Highway Race, the first leg being from Reno to Elko, the second from Elko to Tonopah, and the third from Tonopah to Reno. The nine original entries for the race, with their drivers were:

Ford—Myron Doyle and John Bart.

Hudson—E. W. Damler and Joe Grijalva.

Essex—George Harrison and B. McKelvy.

Templar—J. H. Ottens.

Buick—J. A. Nikrent and Fred A. Nikrent.

Lincoln—W. W. ("Bill") Bramlette.

Studebaker—Hart Weaver.

Hudson—Roy C. Craig and Frank Cochran.

Oldsmobile—C. W. Westwood.

Stock cars were used, and thousands of motorists from many sections of California and Nevada drove into Reno for the race, which was the opening event of the round-up festivities which continued through the night of July 5.

In the early stages of the race the pace set by the Studebaker light six between Reno and Fallon was the fastest of the day, the average being 41.6 miles, but Weaver was forced to relinquish the lead to the Essex and the Hudson, owing to vacuum tank trouble. These two then acted as pacemakers until the Hudson was forced out by tire troubles. The average time for the first day's grind was 33.3 miles, the 344 miles being covered in 10 hrs., 16 mins.

Bright Spots Gleam Field of Automobile Parts Makers

New York, July 8—Notwithstanding the almost phenomenal sales of motor cars at retail in most sections of the country, the excellent trade of distributors has not been reflected fully in the business of parts and accessory makers. This would seem to indicate that numerous car manufacturers had on hand a large number of surplus cars when they suspended, in a large measure, the buying of materials late in May.

The business of parts makers is exceedingly spotty. Some of them are keeping fully abreast of their May business while others report there has been a sharp falling off in orders. Most of them have two or three motor car companies which are good customers, but are getting little business from others which previously have been on their books. It is probable however, that the latter half of June will show a greater volume of business than the first half.

Reports from Detroit and other cities are to the effect that some parts plants which had contemplated a shutdown at the beginning of July, ostensibly for inventory purposes, will continue operations through the month although on a reduced scale.

It is certain that the slowing up of the industry in July will not be so marked as was expected a month ago. Underlying conditions are thoroughly sound and there is reason to believe that after the middle of September there will be a steady upward trend.

CASE REDUCES PRICE $500

Chicago, July 10—Prices on Case motor cars have been reduced from $400 to $500 on all models. The touring and sport models have been reduced from $2650 to $2250, the coupe from $3400 to $2900, and the sedan from $3750 to $3285.

North Carolina Dealers Face Big Tax Question

State Attorney General Demands Collection of $500 Despite U. S. Supreme Court Ruling

RALEIGH, N. C., July 10—While attorneys are advising one or another of the 92 automobile manufacturers liable for the $500 tax recently invalidated by the United States Supreme Court, not to pay this tribute, State Treasurer Lacy is sending out letters calling for the payment of this state tax, and there is another North Carolina-Federal conflitt.

Treasurer Lacy is proceding under the advice of Attorney General Manning, who reads the highest court's opinion as no bar to the recovery of the tax imposed upon these outside dealers. Judge Manning thinks that the Supreme Court merely invalidated the discriminatory section and makes all dealers equal.

Full Tax to Be Collected

The last session of the general assembly put in a proviso making the act applicable to all alike if there was any trouble about it, and Attorney General Manning, after quoting that section, says: "The effect of this provision, in the light of the decision of the Supreme Court of the United States is to strike out from section 79 of the revenue act of 1921 the proviso which, under this opinion, discriminates against non-resident manufacturers, and to leave the remainder of the section intact. Thus, in the opinion of this office, you should continue to collect the license tax of $500 from those engaged in the business of selling automobiles and automobile trucks in the state, and you must likewise collect it to the full amount from those resident manufacturers who have heretofore paid only $100."

The attorney general then gives two reasons why the treasurer is not compelled to return the taxes collected under the acts of 1917 and 1919. Taxes paid under a mutual mistake of the law by payer and the collecting officer are not recoverable, he holds, because no action lies to recover money voluntarily paid. Then a suit against the treasurer under these circumstances is a suit against the state, which cannot be maintained.

START VICTORY HIGHWAY

Sacramento, Calif., July 8—The signing of the Victory Ocean-to-Ocean Highway has begun, the California State Automobile Ass'n. is undertaking the work, which it hopes to complete as far as Jefferson City, Mo., this fall, and to New York next year. The highway runs from New York to San Francisco, through Topeka, Kansas and a central route. The highway is being promoted in California to divert part of the tourist travel directly west to San Francisco and northern California, instead of following the present route south to Los Angeles, now almost universally used.

Inaugurate Raffle Sales of Used Cars in Alabama

Other Novelty Methods Are Used By Southern Dealers to Move Large Stocks

BIRMINGHAM, July 12—Birmingham dealers are trying to outdo each other in schemes for selling the large overstocks of used motor cars they have taken in on recent sales of new models. Almost all of them have specially advertised price sales, while some have inaugurated novelty sales.

Two ideas recently used are, the "Two in One" sale by the Consolidated Motor Co. and the "Used Car for a Quarter" sale announced by the Denegre Motor and Truck Co. Both sales began July 4 with quite a rush of prospects. They will continue indefinitely.

The plan of the "Two for One" sale is one of the many variations of the always popular raffling contests. With each car sold a chance on a $500 used car is given away. Each time 25 cars are sold the drawing is held and some one of the 25 purchasers is presented with the additional car.

"The first sale has been progressing very well so far and the first drawing was held Saturday," said W. W. Garth, president of the company. "Along with all of the other dealers in the district we suddenly found ourselves, after six weeks of fairly good business, overstocked with used cars and with a very small market for them. The prices on the cars included in the sale are extremely moderate, besides the chances which we are giving on an additional car. The stock is moving at a satisfactory rate."' A good feature of the used car raffle is that the lucky man has the choice of taking the additional car or having its value of $500 credited on the car he bought.

Company Gets Sufficient Security

The "Used Car for a Quarter" sale, being conducted by the Denegre Car & Truck Co. is worked out on the Christmas savings club plan; that is, the first payment of a quarter is doubled the second month; the second amount is doubled the third month and so on until the car is paid for, the only stipulation being that the purchaser of each car shall give the company sufficient security to insure payments on the car and to make it sure that the purchaser will carry out his contract.

Included in the quarter sale are such standard makes of cars as the Cadillac, Packard, Stephens-Duryea, Buick, Dodge, Briscoe, Allen, Apperson, Ford, Lexington, Hudson, Chevrolet, Franklin and the following makes of trucks: Pierce-Arrow, Denegre, Fulton and Ford.

DEMONSTRATE POWER MACHINERY

Farmingdale, L. I., July 15—A demonstration of farm power operating machinery was given in this town on July 14 and 15 by the Farm Implement and Farm Power Machinery Development Assn. cooperating with the State Institute of Applied Agriculture. The demonstration included plowing, cultivating, planting, harrowing threshing, wood sawing, hauling and road grading. There were about 25 tractors in operation varying in sizes from 1½ up to 45 hp. Several farm light plans and water systems as well as a number of stationary engines were also exhibited.

From Ox-Cart Drag to Flivver Flight In 90 Years

SACRAMENTO, CALIF., July 8—Ninety-year-old William McCullom of Yankee Jims, a mining town back in the Sierra mountains, has purchased an automobile and declares he will use it in traveling over the narrow and tortuous mountain grades around his home.

Mr. McCullom came to Yankee Jims in 1859, driving an ox cart. At the Michigan Bar precinct he voted for Abraham Lincoln for president, and shortly afterward went east and joined the army, serving throughout the war. When peace was declared he returned to California, and has traveled over the hills by horse-drawn vehicles since that time, until he bought his automobile.

Other motor cars, he asserted, were making the slower vehicles an almost impossible means of locomotion.

Haulers' Ass'n. Favors Parts Makers' Service Stations

Milwaukee, July 11—A resolution condemning the action of manufacturers of assembled trucks in opposing the establishment of parts service stations throughout the country by makers of unit parts was adopted by the National Assn. of Commercial Haulers at its annual convention here. The organization will do all it can to foster the service station idea.

Joseph X. Galvin, president of the National Team and Truck Owners' Assn., addressed the members and told them he had come to the convention to urge amalgamation of the two associations. A resolution favoring such action was adopted, but the action working out of the details was left to the officers and executive committee.

F. J. Alvin, manager of the United Motor Truck Co. of New York informed the convention that he had come to Milwaukee to pledge the assistance and support of his company to the association.

It was decided to separate the office of manager and secretary, both of which have been held by C. R. Collins of California. Collins will remain as manager while Tom Snyder, who is secretary of the Indiana Transfermen's Ass'n., will become secretary of the national association.

One of the resolutions adopted favored passage of the Townsend highway bill.

Steady Upward Trend Marks Factory Production in June

Nearly Every Maker in Michigan District Shows Increased Output for Month of June

DETROIT, July 12—There is a steady upward trend in the demand for automobiles, influenced in great measure by price reductions and shown in the increased production for June in Michigan factories of 24,440 cars, aggregating a total of 168,041 cars. The production of 108,962 cars by Ford as against the Ford output of 101,897 in May is responsible for a big portion of the increase. There was an increase in the production of nearly all the factories, particularly Dodge and Buick. The increase in the output of the Hudson, Essex, Maxwell, Paige, Packard, Studebaker, Chevrolet, Hupmobile and Oldsmobile was marked, and a slight increase was shown in practically every factory in the district.

Dodge Brothers, which built around 450 cars a day the greater part of June, swung into capacity production during the latter days of the month when the official announcement was made that an average of 600 cars would be run off the assembly line daily for the remainder of the year. Oldsmobile Motor Works turned out 3,100 cars in June against 1,775 in May; Packard went up about 200; Hudson about 100; Essex about 200; Paige 400; Hupmobile 250; Chevrolet 1,500; Studebaker about 1,000, and Maxwell 1,600. Buick went more than 1,600 ahead of May, and the same is true of Dodge Brothers. Ford announces a daily output of 4,545 cars during July, or a monthly total of 109,000 cars and trucks. Of this total about 10 per cent are trucks. Fordson tractors are now coming off at the rate of 250 daily at River Rouge.

SHEET METAL JOINS M. A. M. A.

New York, July 12—The Sheet Metal Manufacturers Ass'n. decided at a meeting in Detroit last week to dissolve and continue its work as a group of the Motor & Accessory Mfrs. Ass'n. It will be the first of many similar groups to be formed within the M. A. M. A., as its decision to dissolve will be followed by similar action on the part of several other organizations of manufacturers engaged in the same line The first group contains some of the leading sheet metal workers in the United States who do an automobile business.

FEW CHANGES IN COLE

Indianapolis, July 10—Changes in the present models of the Cole car will be few, according to officials of the company here. Virtually the only changes that either are being made or are contemplated will be made in the sedan. Formerly the company used the conventional sedan construction of wood and steel, but is now switching this construction to an all aluminum body.

Concerning Men You Know

E. A. Sattler, until recently director of sales of the Howe Rubber Corp., New Brunswick, N. J., and Theodore Weigele, formerly assistant sales manager of the same company, have taken over the sale of the entire output of the Eckrode Rubber Company, Inc., of Newark, of which Clement E. Eckrode is president. Sattler was elected vice president of the company at a meeting of its board of directors several days ago. Business will be conducted under the name of Eckrode Rubber Co. with offices in the Viehmann Building, New Brunswick, N. J.

Frank Rose Manufacturing Co., manufacturers of Rose Specialties has guaranteed its prices up to Jan. 1.

Ian E. Maltby has joined the Milwaukee Auto Engine & Supply Co. as director of sales and advertising. This company manufactures timers for Fords.

George R. Morris has resigned as manager of the Chevrolet New York retail store to join W. C. Sills, former sales manager of Chevrolet, in the distribution of that car in the New England district. Harry Horton, who has been manager of the Providence retail store will succeed Morris in the New York managership.

W. J. Drumpelmann, assistant sales manager of the Hudson and Essex for the last four years, has resigned. He was for three years formerly in the sales department of the Chalmers Motor Co. He has not announced his future plans.

P. L. Emerson, assistant salesmanager of the Reo has been transferred to San Francisco, where he will take charge of the Reo branch.

Harry B. Allen has recently been appointed division sales manager for the Selden Truck Corp., Rochester. His territory comprises Wisconsin, Minnesota and Northern Michigan, with headquarters at Minneapolis.

Eugene Bournonville, the head of the Bournonville Welding Co. has invented a rotary valve engine and has manufactured about half a dozen of these at a plant in Hoboken, N. J. It is understood that Bournonville will also manufacture a car in which this engine will be used and the car will be known as the Rotarian.

Dealers and Makers Nearing Solution to Many Problems

Detroit, July 8—Following a lengthy session of committees representing the National Automobile Chamber of Commerce and the National Automobile Dealers' Assn., held here July 1, it has been announced that the problems of the dealers will be submitted in a statement to the manufacturer at a meeting to be held in Buffalo, July 12. At this meeting efforts will be made for a closer cooperation between manufacturer and dealer. It is said that the dealers' representatives were highly pleased at the attitude of the manufacturers and that they are confident their suggestions will be acted upon favorably.

Part of the session was devoted to the question of contract cancellation and it was learned that virtually all present agreed that cancellation should be only by factory authority rather than at the hands of various persons as at present. An opportunity for appeal by the person whose contract is cancelled also appeared to meet with favor, as well as the plan for the elimination of definite contract renewal dates, allowing the life of the contract to depend entirely upon the performance of the dealer. The question of the disposition of cars in cases of cancellation brought forth much discussion, but no definite action was taken.

Alfred Reeves, general manager of the N. A. C. C., expressed satisfaction over the harmonious attitude apparent at the meeting and gave it as his opinion that solutions to all problems would be found to the entire satisfaction of all concerned.

DEALERS NEEDED AT HOME

Columbia, S. C., July 8—The semi-annual meeting of the South Carolina Automotive Trades Assn., which was to have been held at Greenville on July 20, has been postponed until December. Announcement to this effect was made by A. Mason Gibbes, president of the association, who said that the association's directors had taken this step after a careful survey of conditions surrounding the automotive trade at this time.

"While there has been some improvement in conditions," Mr. Gibbes said, "this improvement has not been so marked that we would feel like taking the dealers away from home at this time. We hope to make our December meeting the biggest that has yet been held." While calling off the meeting at this time Mr. Gibbes feels that the crisis in the industry is passed and that business is again on the upgrade.

Second Edition of Repairman's Helper Off Press

The Automobile Repairman's Helper, by S. Thornton Williams and J. Howard Pile. U. P. C. Book Co., 243-249 West Thirty-ninth street, New York City.

The second edition of the Automobile Repairman's Helper is so greatly enlarged and so radically changed that it bears little resemblance to the first edition which was printed some two years ago. The contents consist of the Better Mechanics articles, which have been appearing in Motor World for the past four years and these are edited and arranged in an orderly manner with a complete index so that any subject or any car or truck can be located very quickly.

The articles were prepared with the thought of assisting motor car mechanics to better methods of care, repair and maintenance of motor vehicles. In the preparation of the material over 2000 shops in all parts of the country have been visited, factory service departments called upon for data, and various methods of performing operations observed and studied.

The present edition, including practically all articles up to date, has become so large that it was necessary to divide it into two volumes. The first volume, now ready, takes up building design and layout, systems for saving time and money, shop equipment, standard shop practice on cylinders, electrical systems, batteries, bearings, etc. The following cars and trucks are covered by complete mechanical instructions: Dodge, Overland, Chevrolet, Reo, Cadillac, Studebaker, Oakland, Hupmobile, Willys-Knight, Liberty, Cole, Chalmers, Autocar, Republic, Reo truck, Garford, Koehler and Nash truck.

Volume II, which is in preparation and will be printed shortly, takes up other problems of the repairshop and gives detailed shop operations on a number of other cars and component parts such as clutches and axles. The volumes are sold for $3 each.

OHIO LAW HALTS THIEVES

Toledo, July 10—Nearly 7,000,000 Ohio automobile and truck owners will have to fill out blanks with affidavits to show that they rightfully own their machines before August 17 when the Atwood Bill passed by the recent state legislature goes into effect.

The new law is framed to check auto thefts, and after the initial registration, all machines will be registered with the county authorities when sold, and from then on will have to be registered whenever sold or changing hands so as to preserve a clear title. Only tractors are excepted from the working of the law.

SENATORS TO FIGHT TRUCK BILL

Cleveland, July 8—State senators have given their pleges to the Cleveland Automotive Trade Ass'n. that they would lead a fight at the next session of the Ohio General Assembly to restore to Ohio highways the 14-ton maximum of truck and load combined.

A measure passed this year limits the weight to 10 tons. The Cleveland organization joined with the state and other kindred bodies to fight the measure, and delegations asked the governor not to sign the bill. The executive approved it, however.

The action in this city is the opening gun of a battle that will be waged against the bill by all automotive trade associations in the state under the leadership of the state body.

STEPHENS WINS TAHOE TEST

Sacramento, Cal., July 9—The grand prize in the second annual reliability and economy run from Sacramento to Lake Tahoe and return was won by a Stephens Salient Six. The race was held under the auspices of the Sacramento Automobile Association. Results were:

Grand prize, Stephens Salient Six.
Class 1, cars under $1,000, Overland.
Class 2, cars $1001 to $1500, Maxwell.
Class 3, cars $1501 to $2000, Essex.
Class 4, cars $2001 to $3000, Stephens.
Class 5, cars $3001 to $4000, Packard.
Class 6, cars $4001 and over, National.

The course of the run was from Sacramento to Tahoe, via Truckee and Emigrant Pass and return by way of Placerville, 256 miles over difficult mountain roads.

Better Business
Money-making Ideas

A dollar will be paid for all ideas accepted as Better Business—Perhaps you have some

Builds Up Business By Clever Ads

An Indiana man who wanted to get into the automobile business but who had comparatively little money, evolved the plan of working up a brokerage business by the use of classified advertisements in the local newspapers. He secured an office room in a down-town building and then inserted the following ad:

"TO SELL. List your car with an experienced salesman for fifteen days; no sale, no charges. Phone 48223."

Of course this ad brought him replies and, after making a deal with a car owner as to the price wanted and the commission he was to get, this man inserted another classified ad describing the car and making it appear as attractive as possible. This second line of ads, together with his personal solicitation, resulted in his making a number of sales from month to month and eventually in working up a good business. This plan for securing cars to sell might be adopted by used car dealers with good results.

Sells Reserve Tank at "Psychological Moment"

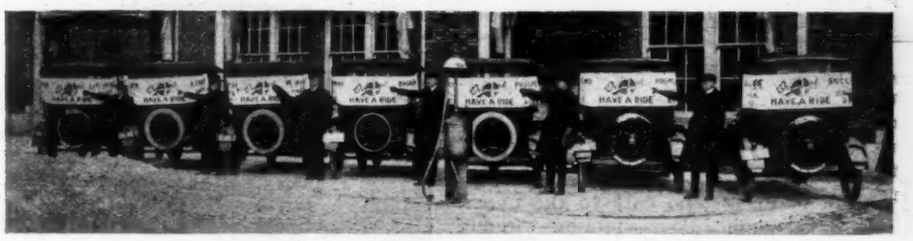
No one thinks he is so stupid that he will run out of gasoline, so it is difficult to sell him a reserve system. However, when a call comes in for a service car to bring a can of gasoline, one Iowa dealer finds he can nearly always sell a reserve system if he sends it along. Just another instance of closing the deal at the "psychological moment."

Increasing Sales of Valve Grinding Compound

A successful garageman recently put into practice an idea which is working well with him and should prove of value to other garagemen.

He does a great deal of valve grinding and when a job comes in he takes from stock a new 4-oz. Duplex can. This particular can contains two grades of compound, one coarse for roughing and the other fine for finishing. From this can he uses as much as is needed, closes up the can, wipes it off and drops it into the kit of the machine on which he is working. He then charges up to the job the can of compound at list price.

When the car comes back it is seldom the can of compound comes back with it, so it practically means the sale of a 4-oz. can with each valve grinding job. There are many cases not only in garage work but in other lines of business in which this kind of an idea is common but it is doubtful if it has occurred to many garagemen in connection with the sale of valve grinding compound.



Everyone in Town Gets Free Ride

During a week when a Waterloo, Ia., automobile dealer was introducing his automobiles to the public he advertised that anyone who would hail the drivers might ride to their destination.

It was a busy week for his seven drivers. Children were taken to school, doctors were taken to patients, invalids were taken to the hospital, men were taken to the depots, workers were brought home from the factories, business men were taken to their stores—over five hundred passengers were carried on the first day. And naturally, every one of them was talking about the car—which, of course, was just what the dealer wanted.

Seizing Opportunities for Publicity

When a car is sold to some person of prominence or is built along unusual lines, there is an excellent opportunity for the dealer handling it to secure a great deal of publicity through a display of the car and the newspaper comments on it.

When Fatty Arbuckle bought a special car of such size that it caused even him to appear small, and with enough extras to cause a banker to tremble, the agent not only showed the car and got newspaper publicity, but had photographs made of the star and his car which, because of his prominence and the unusual features of the car, were gladly displayed by shops.

Linking Up Current Events with Business

Every time anything unusual happens in your community calling for an exceptional use of the cars you handle, it is well to play this thing up and cash in on it as a sales producer. For instance, if a nearby country bank is robbed, here is the way the arrest of the thieves might be linked up with your business:

"The Ever-Dependable Whizzer ran Down the Huntertown Thieves!

"When the Huntertown bank was robbed yesterday and the thieves surrounded in a nearby woods, Sheriff Jones made the run to the woods in record-breaking time in his Whizzer car, recently purchased from us.

"When Sheriff Jones purchased this car he said that he wanted a machine that would 'be there' in an emergency. His Whizzer was 'there' yesterday and is always 'there' whenever needed.

"Remember that the car which is able to give extraordinary service in emergencies, is the car that is best fitted to give exceptional service day in and day out.

"Buy a Whizzer NOW."

Automotive Architecture

Planning & Building Problems

Conducted by Tom Wilder

Automatic Garage Designed to Save Space

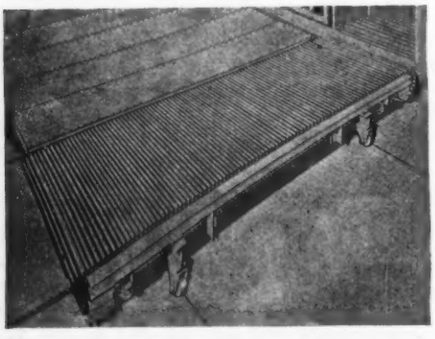
Planned to Provide Storage in Congested High Rent Disricts at Reasonable Cost—Only 155 to 167 Square Feet of Floor Space Required for Each Car

THE constantly increasing congestion in our city streets and the increasing number of automobile parking ordinances have brought forth numerous special building systems to cope with the situation. The ideal involved is to get the cars to the upper floors of a multi-floor building without prohibitive expense or congestion. It is conceded that if enough cars could be stored on a given piece of valuable city property, handsome returns on the investment could be realized.

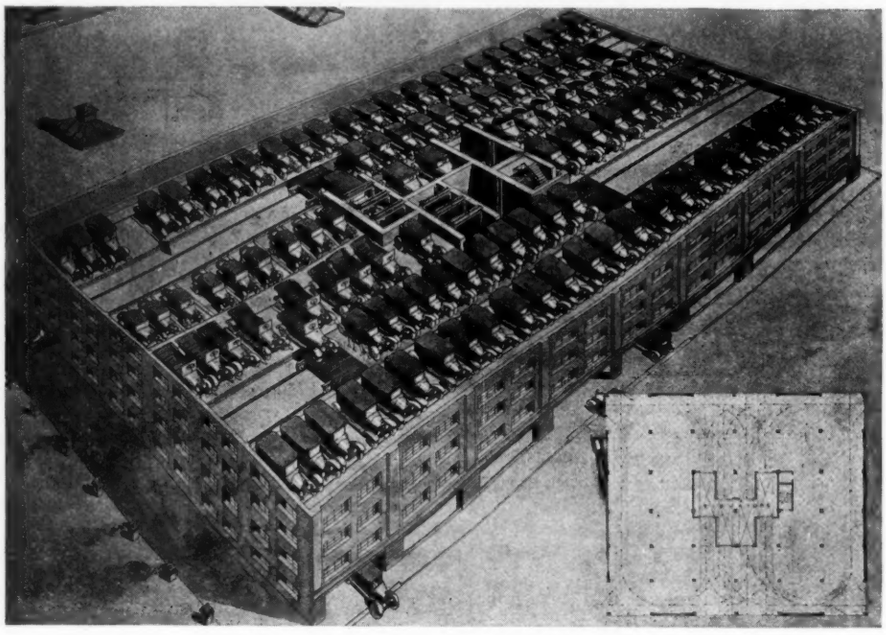
The Automatic Garage System of Chicago have a novel method which is described by a booklet just issued. The description which follows is for the most part quoted from this booklet, and if the system works out as well as it appears to on paper, it should be a good solution of the problem. One thing in its favor is that the rate of 155 to 167 sq. ft. of floor space per car is much lower than any other system could involve.

As will be noted in the illustrations, elevators and conveying machinery will be used. The car owner drives into the garage, receives a call check, a duplicate of which is attached to the car. He then drives into the elevator indicated on his check, stops his engine, and may then leave the garage.

The elevator carries the car to the floor indicated on the check. In front of the elevator and at the same height as the landing, is a motor-driven platform which runs the length of the building on tracks in a shallow pit built into the floor. At each end of the platform is a motor-driven conveyor. There is also a conveyor built into the floor of the elevator.



Moving platform with conveyor used to manoeuver cars in the automatic garage



This illustration shows an Automatic Garage designed to store 109 cars per floor on a plot of ground approximately 175 ft. long by 100 ft. wide. As will be seen from the small plan in the corner the first floor is given over almost entirely to manoeuvering space this being the point in the ordinary garage where congestion occurs at the rush hours, night and morning. Four elevators are provided which, according to the company's figures, will dispose of 240 cars per hour on the basis of an 8 story building

The operator starts the conveyor in the elevator which pushes the car onto a conveyor at one end of the moving platform. The storage spaces are located on either side of this platform and the operator moves the platform till the car is opposite the space reserved for it. The conveyor on which the car is resting is then operated and deposits the car in its stall.

From the time the owner leaves his car until he is in possession of it again, the car is never under its own power—thus eliminating fire risk, reducing dirt and noise, preventing carbon monoxide fumes, and saving the car owner's fuel. The owner stays on the main floor—his machine is handled only by a trained operative, or automatically. This does away with confusion, mistakes, arguments, or possible accidents.

Two factors are indispensable in profitable garage operation — economy of space, and economy of overhead. Aside from the large volume of trade attracted by its unique features, the Automatic effects astounding savings for the garage owner. The accompanying illustration of a typical garage shows this.

The garage has a capacity of about 110 cars per floor above the first. The first floor contains repairshops, store, wash and showrooms, as well as the necessary driveways. The basement contains the boiler room and overflow space for cars. One hundred fifty-five to one hundred sixty-five square feet is the average floor space for each car—a very low figure. This space saving means that Automatic construction will permit

housing more cars than any other form of multiple-floor garage.

The number of cars per elevator depends somewhat upon the type of service desired. Except in very unusual service it is found that the peak load in the average garage comes in the morning hours, when car owners are arriving at their places of business. The Automatic is particularly designed to handle such loads without delay or confusion. Storage or delivery is accomplished with the same accuracy and dispatch.

There are practically no limitations to the building areas which may be used for this system. The most effective plan, however, requires a site about 100 feet wide or deep. The other dimension may be more or less than this amount. The elevators are usually located in the center of the building and adjacent to one another, but if the building site will not permit this, the elevators may be located towards one side of the building.

Entrance to all elevators is made through one central driveway in the rear or front of the building, while exits from elevators are made on the sides or through the center, thus avoiding congestion and danger of collision. This general arrangement may be modified to suit the building or ground conditions.

In buildings where a great number of cars is handled every day, signal boards on the main floor indicate to patrons whenever their cars are being delivered from any of the storage floors to the ground floor. This signal board works in connection with the elevators, and for every car delivered indicates the elevator number, floor number and space number assigned to the car at the time it was stored.

This signal's use is optional. It may be operated very effectively in connection with the operating office and central control system described. In small garages, where one elevator is sufficient, the control and signal system may be entirely eliminated at the option of the owners.

ESTIMATED COST OF OPERATING AUTOMATIC GARAGE

Interest $1,000,000 @ 8 %		$ 80,000
Taxes, $960,360 @ 1%		9,600
Ins., $450,000 @ 20 cents		900
Water		1,500
Depreciation and Amortization		
Bldg.—433,400 @ 2 %	8670	
Transfer tables, 28,500 @ 5%	1425	
Conveyors, 30,900 @ 10%	3090	
4 Elev., 64,000 @ 3½ %	1825	
4 Elev., 64,000 @ 3½ %	1825	15,000
		$107,000
Labor and Management		
1 Manager		$ 4,000
10 Elev. men		20,000
3 Dispatchers		9,000
3 Janitors		6,000
20 Floor and Maintenance men		30,000
Heating		
3 Firemen—6 mo		3,000
3 Engineers—6 mo		3,750
Coal		4,000
Power and light		9,000
		$ 88,750
Total		$195,750

The figures were compiled by the Automatic Garage Co. Chicago

AUTOMOTIVE ARCHITECTURE

In this department MOTOR AGE aims to assist its readers in their problems of planning, building and equipping service stations, garages, dealers' establishments, gas filling stations, and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars it is expected to garage.

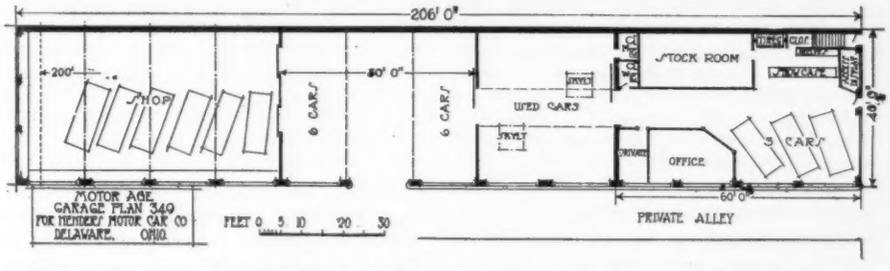
Number of men employed in repair-shop.

And how much of an accessory department is anticipated.

Lot Too Narrow for Front Entrance

PLAN 349

We plan to build a one-story garage on a lot 40 by 206 ft. with a two-story brick 40 by 60 on the lot. This we want to remodel into a first class salesroom with room for about three cars on the floor and about a $3,000 stock of tires and accessories together with offices. Back of this room we want the second-hand car department and space for storage, and in the rear of the lot we want the shop. The building will cover about 200 ft. in length but this can be changed somewhat. We will employ two mechanics in the shop as we expect to do service on our own cars, the Nash and Dort.—Henders Motor Car Co., Delaware, O.



Plan 349—It is not advisable to build a garage as salesroom on a lot that is too narrow unless it is on a corner lot or next to an alley so that excess to the rear may be had without a driveway through the front portion

Unless so favorably located that nothing else would possibly be as desirable, it is not advisable to use a space as narrow as 40 ft. for a garage building. A 40 ft. building is permissible when it is on a corner or next to an alley so that access to the rear may be had without a driveway through the front portion.

We have based our plan on the use of the private alley as a driveway into the garage and shop. If the alley cannot be used in this way then our plan is no good and it will be impossible to make a plan that would be worth much.

Taking off 10 ft. for a driveway, 4 ft. for stairway and partitions and 2 ft. for outside walls, we have only 24 ft. of the frontage left, barely enough to show one car. In other words, the driveway would use all the space now devoted to the accessory store and stockroom and these would have to be cramped into smaller quarters, greatly reducing the working space all along the line.

Unless you have a good reason for stopping the building at the 200 ft. point, we would think it better to extend it to the full depth of the lot. The 6 ft. would be of no value outside and might be very valuable inside; the extra expense would not be great.

Cleveland Dealers Strike Fast Pace in July Start

Cleveland, July 12—Price reductions will make July this year a banner month for the local retailer of automobiles, according to statements made by several dealers who were visited at the close of the week July 9.

The first week of July started off with sales far ahead of transactions recorded on an average in the same period in the past several years. July long has been regarded as the first month of declining sales, but this year every dealer visited noticed a stimulation of sales.

The Barnes Motor Co., which has the Dodge Brothers agency, noticed no let-up in the demand for cars during the first week of July. These six days were filled with as many sales approximately as were the first six days of the previous month.

The Chevrolet had a similar report to make with reference to the first week of July. New cars are moving easy, while used cars are harder to dispose of at this agency.

The Auburn agency will set a new record for July unless there is a complete up-set of the hope that was established by sales in the first week of the present month.

The Buick agency did as good business the first six days of this month as it did the first week of June. So did the Oakland, Overland, Willys-Knight, the Jordan, Peerless, Stearns, Templar and Franklin agencies.

The Readers' Clearing House
Questions & Answers

Bridge Testing Magneto Armatures

Q—PUBLISH diagram of test for magneto winding without removing condenser.

2—Publish internal connections of 5-brush Simms-Huff motor generator used on Maxwell car.

3—Publish diagram of Delco starter generator used on Model B-25 Buick.—Arthur Henrickson, Duncan, Okla.

CONDUCTED BY WM. H. HUNT
Technical Editor, Motor Age

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

See Fig. 1. This is what is known as the bridge test and is useful for many things besides the testing of magneto armatures. It may be used for locating short and open circuits in generator windings and ignition coils, as well as opens in starting motor armatures. It is not so good for locating short circuits in the last for the reason that the resistance per coil is normally quite low and the difference between a normal coil and one with only one short turn short circuited is very small.

The wires of the "bridge" should be of large size, say about No. 8 or 10, in order that they shall offer as little resistance as possible. The points 1, 2, 3, 4, 5, 6, 7 and 8 should be equipped with generous size binding posts and the latter kept clean and bright. All wires must be of the same length and size with the exception of those which lead to the apparatus to be compared. These may be of lamp cord (No. 14 or larger) but of exactly the same length. The meter may be either a milli-volt or a simple galvanometer which can be quickly made with a compass and a few turns of wire.

If the milli-voltmeter is used it should be set so that the pointer is in the middle of the scale. The figures of the scale may be disregarded, as the test is a comparative one in which a suspected device is balanced against one which is known to be normal. The battery may be one or two cells of a storage battery or three or four dry cells. The more voltage used the more sensitive will be the test.

To use the apparatus two devices are connected into the legs of the bridge between the points 5 and 6 and 7 and 8. The gap marked AN is for the armature, coil or other device that is known to be in working order, while the gap AX is for the suspected part. Of course in making these tests it will be necessary to have two devices of the same model, such for instance, as two DU 4 Bosch magneto armatures.

In connecting up armatures one of the test wires is connected to the metal at any point, such as the nut on the end of the shaft, and the other under the hexagon headed screw which holds the breaker block in place. The breaker points are opened and insulated from each other by placing a thin piece of paper between them. It will be well not to connect the meter wire to the binding post No. 3 but to leave it loose so that it can be quickly struck upon it after the connections are made. The reason for this is that a sudden rush of current might damage the meter if the suspected armature differed greatly in resistance from the normal one.

It will now be considered that all connections have been made. Strike the wire from the meter on binding post No. 3. If there is a very decided deflection of the meter pointer in either direction a fault in the suspected armature or coil is indicated. In the case of the armature it is really immaterial whether such a fault is caused by an open or short circuit as, in either case, a rewind will be the only remedy.

To test the secondary winding the procedure is the same with the exception that the test wire is connected to the secondary slip ring instead of under the hexagon screw. This must be done with both armatures. It may be necessary to increase the voltage for the reason that the resistance of the high tension winding is much higher than that of the primary. If the outfit is used a great deal for the testing of one kind of apparatus, a permanent resistance equal to that of a normal part can be made up and connected between the posts 5 and 6.

To make such a resistance, procure several feet of No. 26 german silver wire

Diagram of the Bridge Test for Armatures

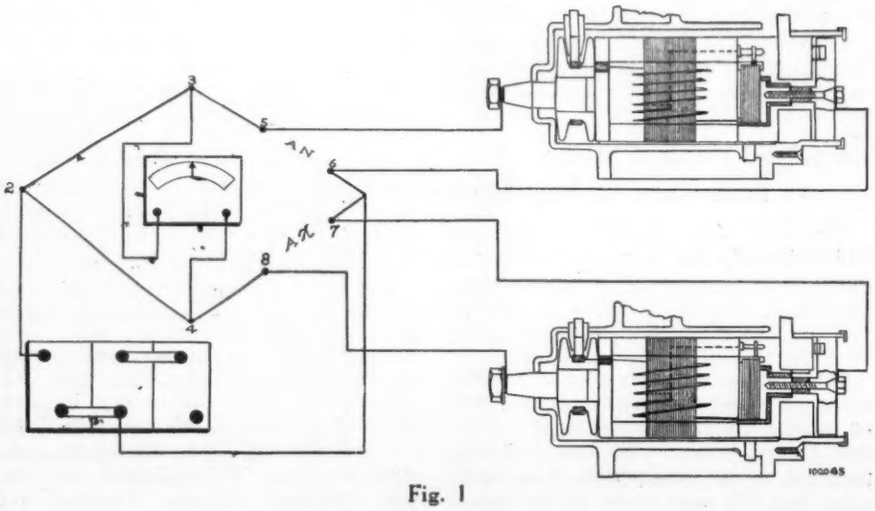


Fig. 1

Fig. 2—Simms-Huff generator rig of five brush machine

Wiring of Simms-Huff 5 Brush System

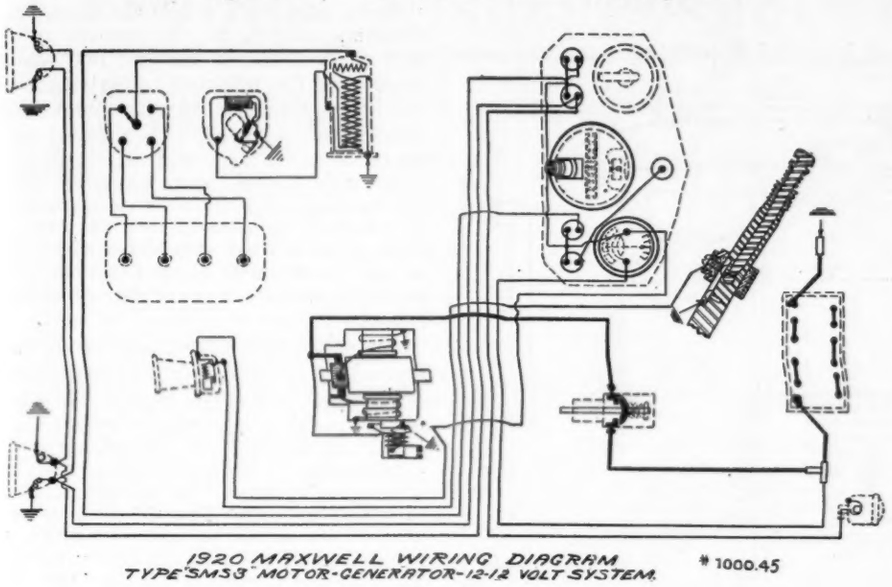


Fig. 3

Delco Junior System of Circuits—Buick B24, 25

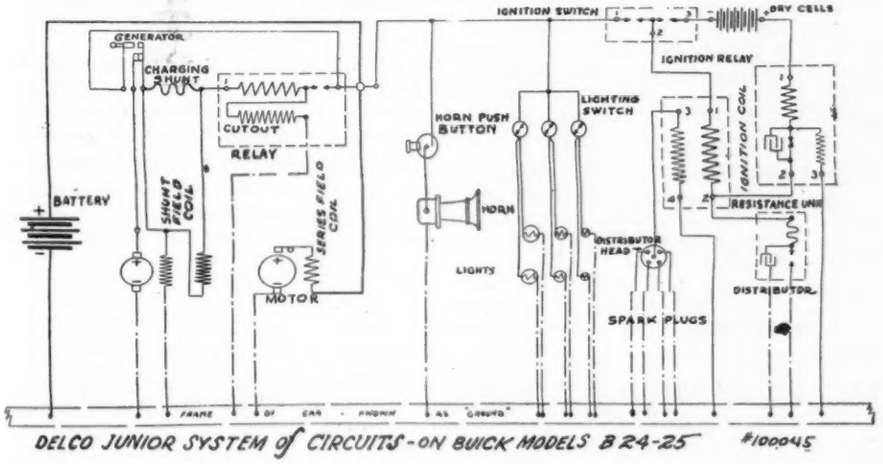


Fig. 4

and connect one end to binding post No. 8. Now with a known normal armature, or coil, connected to posts Nos. 6 and 8 and with the battery connected up as for a test, press the wire at various points along its length to binding post No. 8 and, while holding it steady, strike the meter wire on post No. 3. A point will be found on the wire where its resistance exactly balances that of the part being used for a guide. This is indicated by the meter failing to indicate when its wire is struck on the post.

Mark the resistance wire at this point and cut off. Wind the wire on a spool or wooden rod, (a section of broom handle will do) with the turns carefully separated from each other. The ends of the wire must be left long enough so that they can be directly connected to the binding posts 5 and 6 when making future tests, for the reason that if any more wire is added to them the carefully worked out balance will be upset. The resistance unit should be marked with a tag bearing the make and model of the apparatus which it balances. For instance "Bosch, DU 4, Primary" or "Delco Coil, Cadillac 1914, Primary." If sufficient pains are taken to make up a set of units comparative tests can be made on any apparatus which may come into the shop. As will be seen the condenser does not figure in the foregoing test at all.

2—See Fig. 3. This is also the diagram for the seven brush machine. Fig. 2 shows the arrangement of the five brush rig.

3—See Fig. 4.

TESTING AUTO-LITE STARTING MOTOR

In studying your electric articles in Motor Age, the impression is gained that the resistance is equal to one-half of one light when the lamps are wired in parallel? If not, what would be the reason?

1—Could Ford lamps be wired in parallel If not, what would be the reason?

2—Why is it in some wiring systems the positive terminal of the battery is grounded to the frame and the negative to the starter switch? Does the generator charge the battery through the frame? Is it correct that the battery sould be charged from the positive side?

3—When testing a starter from a Chevrolet car, model 490, of the Auto-Lite six volt type by connecting four dry cells to positive terminal, fire is drawn from any part of the starter housing whether the armature is in or out altogether. Upon disconnecting the end that holds the brushes fire is drawn from the housing that holds the fields but none from the housing that holds the brushes. Would that indicate a short in the fields or is that a natural condition owing to the magnets being connected to the housing?

4—Give name of good book on electricity and address.

5—Chevrolet car (490) running without battery shows discharge on ammeter when lights are off. Wiring seems all right and changing ammeter does not help.—T. J. Kearns Nemiskam, Alta.

Your impression is correct. When lamps are connected in parallel the total resistance is equal to half the resistance of either lamps. The reason for this is that two paths are offered for the current.

1—Yes. It would be necessary to use lamps with a voltage rating of from 18 to 24 volts.

2—It makes no material difference which side of the battery is grounded so long as the generator ground is of the same polarity. This is simply one of the things that has not been completely standardized. The frame of the car, being of metal, acts as one side of the circuit between the generator and the battery. In this sense it is correct to say that the generator charges the battery through the frame. Theoretically, the current flows from the generator through the battery from positive to negative. This is a natural law and, of course, cannot be changed. It is necessary that both the positive and negative terminals of the generator be connected to the battery.

3—There should be no current flow between the positive terminal of the starting motor and the starting motor frame when the armature is removed. That there is such a discharge indicates that part of the circuit, probably inside the field windings, is in contact with the metal of the motor frame or one of the pole pieces. We are strengthened in this belief by the fact that when the field wire is disconnected on the brush rig, current still flows between the positive terminal and the starter frame. The illustration shown in Fig. 6 will make the point clearer. The negative starter terminal is a normal ground and, naturally, a test between this point and the starting motor frame will show a discharge.

4—We suppose you mean a work on automotive electricity. A very good work on the subject is the "Electrical Equipment of the Motor Car," by Moreton & Hatch, published by the United Publishing Corp., 241 W. 39th st., New York.

5—This part of your query is not clear as we do not understand what you mean by the engine running without battery. This might be done if the engine were first started with the battery and speeded up to high speed and the bat-

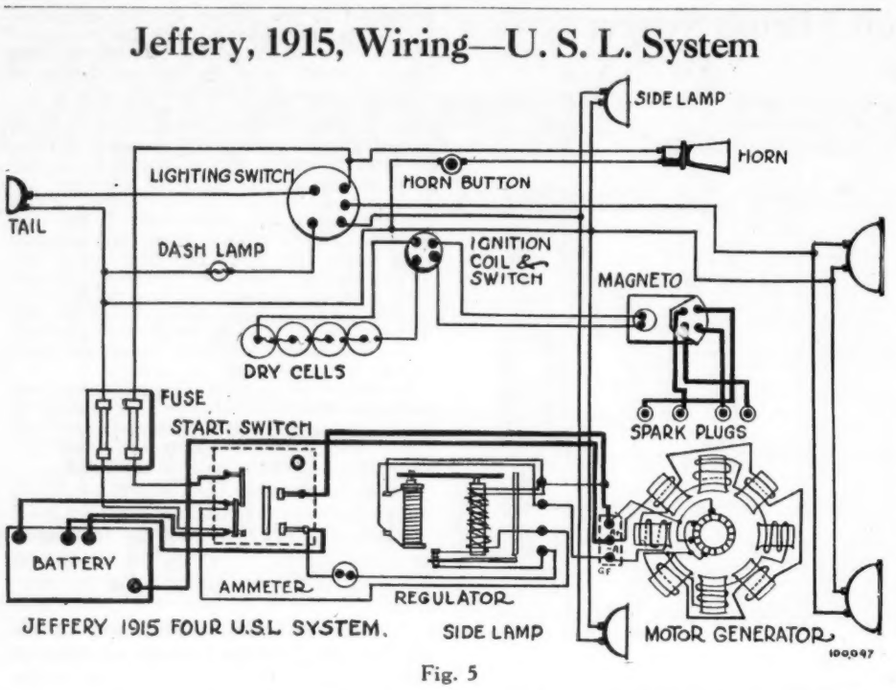


Fig. 5

tery then disconnected, as the generator would be up to speed and would probably furnish sufficient current for the ignition coil. This would be a risky experiment and might result in the burning out of the generator. If you will kindly be more explicit we will be pleased to give the correct answer.

TESTING ELECTRICAL SYSTEMS FOR DISCHARGE RATES

Q—Can you give us the maximum charging and lighting load on a Jeffrey model 4 engine number 45141, car number 1770; car uses a twin six volt battery?—King Motor Company, Lake Mills, Ia.

Very few of the manufacturers of automotive electrical apparatus supply information regarding discharge rate. Consequently, such data is difficult, and oftimes impossible to obtain. However, thanks to the advent of such testing instruments as the Weston 280, the Roller-Smith Handy, the Hoyt Rotary and the high discharge battery testing apparatus, it is now easy to take reading of the current required for the lamp and starter load. Referring to Fig. 5, if any of the wires attached to the fuse clip are disconnected and either of the instruments mentioned inserted into the circuit, using the 30 amp. shunt, the current required by the lamps can be easily read.

Determining the starting current is a trifle more difficult but by no means impossible. Again referring to the diagram; disconnect either of the heavy cables from its terminal on the top of the starting motor housing. For instance, say that it is decided to use the terminal "A" negative; with the cable disconnected from this terminal insert the ammeter using the 300 amp. shunt. The cable can be directly connected to the heavy binding post of the shunt and another cable of the same size connected between the remaining shunt terminal and the starting motor binding post. Upon depressing the starting pedal the current required to turn the motor will be indicated by the meter. If the instruments mentioned are not available, one of the type used to take battery discharge reading is suitable. The connections are made in the same way. The current drawn will probably not exceed 200 amp. for the momentary load and this should decrease materially after the engine is in motion. It is recommended that after any automotive electrical operation involving the starting motor, the foregoing discharge test be made. It will determine whether or not there are any grounds in the starting motor circuit as well as indicating short circuits in the motor itself.

EFFICACY OF INTENSIFIER SPARK GAP

Q—There are on the market a few multi-gap devices, the object and function of which is to be placed in series with the spark plug of an automobile engine to assist the spark plug in giving a livelier spark and thus insure more perfect ignition and more power to the engine. State if this is true and, if so, upon what principle it is based. The device is merely a series of metallic plates insulated from one to another, thus forming a multi-gap. I have been informed that eventually the use of such a gap would destroy the induction coil; is this true?— E. Bishop, Washington, D. C.

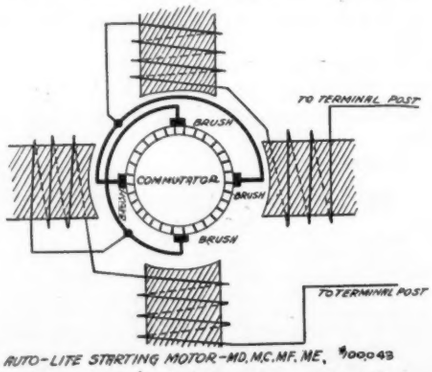


Fig. 6—Internal circuits of Autolite starting motor

There have been numerous spark intensifiers offered on the market from time to time during the last few years embodying the principle underlying the one about which you inquire. While the reason for the effect is somewhat obscure, it is a fact that an auxiliary spark gap in series with the spark plug will cause a badly fouled or even cracked plug to fire. It is also a fact that two or three or even more short gaps will have a greater intensifying action than one gap of a width equal to that of all of them.

The use of intensifying gaps on an engine which is inclined to foul the plugs many times, proves an effective remedy and is always worth trying. That intensifiers add anything to the efficiency or performance of a clean running engine is open to question. As the gap throws an additional load onto the coil, naturally, if the latter is not well made a breakdown of the insulation may result. This almost invariably occurs in the condenser.

BOOKS ON STORAGE BATTERY MANUFACTURE

Q—State where I would be able to obtain books on storage batteries, explaining the subject in some detail.—A. E. Caldwell, Galesburg, Ill.

The Automobile Storage Battery, Its Care and Repair, by Darwin S. Hatch, published by the American Bureau of Engineering, Chicago, is quite complete, going into the detail of the repair and service of the various standard makes of batteries very thoroughly. If manufacturing instructions are desired, an inquiry addressed to the Associated Electric Service Stations, 105 West Monroe St., Chicago, will bring the details of the methods pursued by this concern in teaching the subject of plate making.

ARMATURE REWINDING

Q—When the size of wire in an armature coil is known how can one find out how many turns per coil is needed to generate a certain voltage?

2—Publish the name and address of a firm where one can get wire for armature winding.—Battery Service Company of Woonsocket, Woonsocket, R. .I.

1—It is impossible to make such a calculation without knowing the strength of the fields in terms of lines of force per square inch. If it is desired to double the voltage output a trifle more than twice, the number of turns of a conductor one half the size of that originally used should do the work. Reducing the voltage will be simpler as it may be accomplished by inserting a resistance in series with the field windings.

2—Belden Manufacturing Co. and American Steel and Wire Co., both of Chicago.

TIMKEN BEARING TIP

The inner cone of a Timken bearing in a front wheel should be a snug sliding and not a drive fit for the reason that it must be free enough to turn slowly and thus equalize wear.

ENGINES—MISCELLANEOUS

PROPER CLEARANCE BETWEEN VALVE STEMS AND PUSH RODS

Q—State where I could get the valve timing for the different makes of cars for about the last three years; also, the clearance between valve stem and push rod.—Mervin Lawton, Dixon, Ill.

The compilation of the statistics you desire would be a very heavy task. We know of no place where this information could be secured, short of the factories. An application to them would be given consideration but that it would be complied with we rather doubt. The proper clearance between the valve stems and push rods varies somewhat with the different makes and types of engines. A rule which seems to be universally satisfactory is to allow .004 in the intake valve and .007 in the exhaust. The engine must be hot when the setting is made.

HUDSON TIMING

Publish valve timing of a 1911-12, four-cylinder Hudson.

2—Explain markings on flywheel.—G. Backofen, Alliance, O.

The timing on these two models differed somewhat. Following is the correct timing for the 1911 model: intake valve opens 14.46 deg. after top dead center; piston .0924 in. from top. Intake valve closes 33.66 deg. after bottom dead center. Piston is .2853 in. from center. Exhaust valve opens 47.4 deg. before dead center; piston .5735 in. from bottom. Exhaust closes 11.34 deg. after top dead center; piston .0563 in. from top.

Following is the correct timing for the 1912 models. Intake valve opens 14¾ after top dead center. Intake valve closes 33 4/5 after bottom dead center. Exhaust valve opens 47 1/15 before bottom dead center. Exhaust valve closes 11 1/3 after top dead center.

2—We have no diagram of this flywheel but have made up the sketch, shown in Fig. 7 with the markings as given above placed in their correct positions. Upper and lower dead center means that when these marks are at the exact top of the wheel, on a perfect line with the center of the crankshaft pistons 1 & 2 or 3 & 4 will be at the exact top of their strokes.

When the marks In. O. are at the top it means that the intake valve of the cylinder being timed should be just beginning to open. The same applies to the other valve markings. It will be necessary to time only one cylinder, preferably No. 1, as all the others being governed by the same camshaft, are timed at the same time.

LOUD MUFFLER SHOTS WHILE COASTING

We are working on a Dodge car which runs well except when coasting or running down hill. I notice the explosion in the muffler more when I disengage the clutch and coast (the engine still running); when I step on the accelerator it pops like a shot gun. Everything seems to be in good condition, although it uses about a gallon of oil to 100 miles of running. This car is equipped with a magneto. Could it be possible that the magneto would miss while coasting? The wiring is all right and the carburetor seems to work well. As soon as it makes this popping noise it runs fine. Can you tell me what the trouble is?—Roy R. Johnston, Max, N. Dak.

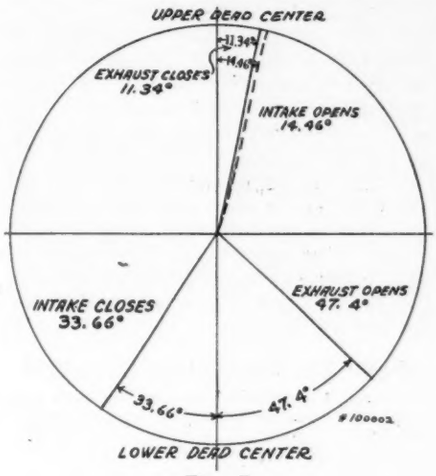


Fig. 7

This inquiry suggests to us that either the low speed adjustment of the carburetor is set very close or that the spark plug gaps are not wide enough. Either of these conditions will allow the gas to pass directly through the engine to the muffler without being burned. Of course these unburned gases collect in the muffler and are fired therein by the first burning charge which comes in contact with them.

If enriching the mixture at low engine speed or widening the spark plug gap does not remedy the trouble an inspection of the intake valve stems and guide will doubtless disclose wear which allows too much air to pass, thus diluting the mixture after it has left the carburetor. The oil consumption is altogether too high and unless there are a number of bad leaks in the engine we are of the opinion that it is passing the pistons too freely. The remedy, of course, will be a regrinding and the installation of new pistons and rings.

ENGINE HAS MYSTERIOUS HALF-TIME KNOCK

Q—We are having some trouble with a model 75-B Overland which has been brought to us for repair. We have overhauled the engine, tightened the main and connecting rod bearings, tested the pistons and rings and ground the valves. The engine runs and pulls well with the exception that it has a knock which occurs at camshaft speeds. It also uses too much gasoline, averaging only about 15 miles to the gallon. If the mixture is cut down there is a back fire through the carburetor when making long pulls on hills. Can you advise us through the Readers' Clearing House?—The City Garage, Ignacio, Colo.

The mysterious half-time knock may be caused by a loose camshaft bearing, a worn timing chain or excessive wear in one of the valve push rods. Any of the three foregoing conditions would give rise to the effect mentioned. Bettering the economy of the older engines is always a somewhat difficult job. However, it does seem that this small engine and light car should make a better average than that mentioned. It is barely possible that an up-to-date carbureter, designed to vaporize and mix the latter day heavy fuel more efficiently would better the economy. At any rate it is well worth trying.

ENGINE IS APPARENTLY WASTING OIL

A Cole purchased in August, 1918, has been gradually getting worse in its consumption of oil, now using about a quart every thirty miles. New .010 in. oversize rings were installed and the car made about 200 miles before it needed a quart. The next quart had to go in a little sooner, until now, about four months later, the car requires a quart of oil about every 25 miles. The car has run 24,400 miles in almost three years.

This condition puzzled us extremely; the plugs don't foul with oil. The only noticeable effect is the consumption. We have no accurate means of determining in this flat country whether the power and pick-up have dropped, but we believe they have.

To try to solve the question, we measured the diameter of the 8 cylinders a few days ago with an inside micrometer; the results are shown in the table below. The measurements under V are vertical, or at right angles to the axis of the car; those under H are horizontal, or parallel to the axis of the car; those under Diff. are the difference between the V and H axes or the elipticity of the cylinders. One set is taken at the extreme top of the cylinder block and the other about 1½ in. lower down, as far as it is possible to reach with the micrometer. What is the answer?—S. W. Armistead, Norfolk, Va.

You have done well with your measurements but have not carried them far enough. The micrometer should have been used at at least ten points in each cylinder. The only thing we have to suggest is that dilution of the oil by the unburnable parts of the fuel is so thinning it that it is passing the pistons and being burned away. Or, it is possible that there is a large leak somewhere which opens while the engine is running and closes when it stops. We lean to the former opinion, and would recommend changing oil every 1,000 miles or oftener.

	TOP			1½ in. Low		
Piston	V	H	Diff.	V	H	Diff.
1	3.520	523	.003	519	520	.001
2	521	521	.000	519	520	.001
3	520	522	.002	520	521	.001
4	526	526	.000	522	523	.001
5	522	525	.003	520	522	.002
6	523	524	.001	521	519	.002
7	521	522	.001	520	520	.000
8	521	525	.004	520	520	.000

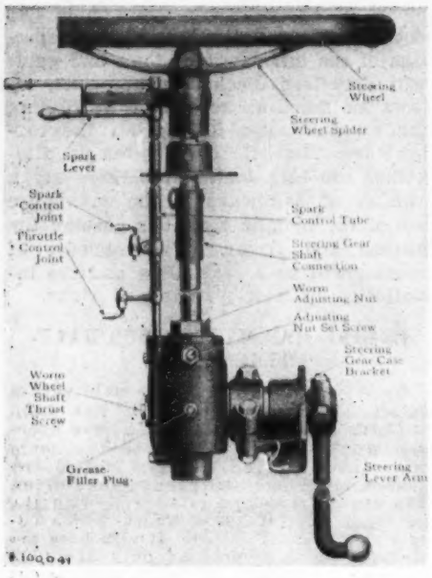


Fig. 8—Dodge Brothers steering gear

DODGE STEERING GEAR ADJUSTMENT

1—Can a Dodge worm in steering gear be given a new mesh by disconnecting drag link and turning wheel ¼ turn?

2—How is end play taken out of Dodge pump shaft?

3—Is the purpose of connecting rod alignment jigs to see that everything is square before assembling the motor?

4—Does the oil in a Ford run from inlet to oil line direct to timing gears or is it provided with holes? Does timing gearcase have to be removed to clean when clogged?

5—Is .003 or .004 enough clearance when installing rings?

6—Does a Borg and Beck Clutch run in oil?

7—By pouring oil in breather pipe in an Overland 90, same blows out. No sound exists to show leaky rings—compression tested by crank seems even and good. Explain cause.—Monte Kintsel, Phoeniz, Ariz.

1—Yes, see Fig. 8. Remove the screw which locks the steering lever arm to the worm wheel stubshaft. After having pulled the arm off turn the steering wheel until the shaft has made one-quarter turn. Replace the lever arm.

2—There are two ways of doing this, both of which are temporary expedients. With a drift or punch drive the bushing projecting from the back side of the timing gearcase inward (toward the front) until it bears solidly against the pump gear. The second method is to remove the front of the timing gearcase and place from three to five spacing washers, cut from .002 in. thick brass shim stock on the exposed end of the pump shaft up against the gear. However by far the better plan is to replace the worn front bushing with a new one.

4—There are no holes in the tubes leading to the timing gear. Either the front timing gearcase or the top of the transmission cover will have to be removed in order to get at the tube. If it is suspected that it is clogged it will be better to remove both the timing gearcase cover and the transmission cover, as, if the obstruction is cleaned out from either end and left in the timing gearcase or the crankcase it is certain sooner or later to clog the pipe again.

5—The recommended clearance for piston ring gaps is .005 for the top rings and .002 for the lower rings.

6—The Borg & Beck clutch is what is known as a dry plate clutch and does not run in oil. The manufacturers recommend that it be flushed out with kerosene occasionally and a good grade of oil applied to the disks sparingly.

7—The rapid motion of the pistons keeps the air in the crankcase in a state of agitation, forcing some out and drawing fresh in constantly. This is true of any engine as many persons have found when attempting to pour in oil with the engine running.

SPEED RECORDS AND TIRE SIZES

Q—What was the fastest time for one mile that was ever made by an automobile? Who made it? Where was it made?

2—What was Oldfield's record for 1 mile with the Blitzen Benz?

3—What tire sizes did the Midland car take?—C. A. Stevenson, Moline, Ill.

1—One mile in 23.07 sec. Tommy Milton. Daytona, Florida.

2—Oldfield's time for the mile with the Blitzen Benz was 27.33 sec.

3—1912 model. L3 front 34x4, rear 34x4—model R—front 35x4½—rear 35x 4½, Model O front 35x4½, rear 35x4½. 1913 models, T-4, front 34x4, rear 34x4, T-6, front 36x4½, rear 36x4½.

MARKING MODEL 37 BUICK TIMING GEARS

1—Give exact place to set and mark the timing gears of a model 37 Buick.

2—Can you get the right carburetion after grinding out .025 to take out scores? —A. C. Aubuchon, Virginia, Minn.

1—A reasonably careful inspection of the timing gears should disclose the original factory marks. If, by some oversight, these marks were omitted, which is most unlikely, others should be placed on the gears before they are unmeshed. Although it makes no material difference in what position the crankshaft may be standing at the time the marks are applied, it is the usual practice to turn the engine until number one piston is at the exact top dead center of the compression stroke.

2—It will be impossible to adjust the carbureter for low speeds with such a wide clearance in the pistons. An engine so badly worn would behave satisfactorily at high speed but would be impossible to throttle. It is recommended that oversized pistons and rings be fitted.

WIRING DIAGRAM OF STUTZ 1917 MODEL R

Q—Publish wiring diagram of Stutz 1917 model R series 61 with an old type German Bosch magneto.—D. L. Warren, Jonesboro, Ark.

See Fig. 9. The small diagrams show the single spark magneto and the two spark magneto, the latter as used on the 16 valve motor.

EXPERIMENT WOULD NOT BE WORTH WHILE

Q—Advise whether a gear pump could be used on a Ford without a starter? We have a gear pump, gears 1⅜ and dash sight feed. We have been thinking of driving it with the fan belt. If you think it would work, let us know the best way to hook it up. If tubing is connected in bottom pet-cock there might not be enough oil to keep the pump working steadily. Would it be better to connect the tubing at the bottom of the crankcase? If there has to be a check valve in line, indicate the best place to put same. Also what size tubing would it be best to use?—Hons Electric Auto Co., San Francisco.

It is very doubtful whether such an outfit would compensate for the money, time and labor expended. Installing and driving the pump would be a simple matter, but it is doubtful whether it could be depended upon to lift the oil the height and distance required. The only advantage of such a system over the standard one is that the oil could be seen passing through the sight feed.

1917 Stutz Wiring, Remy & Bosch System

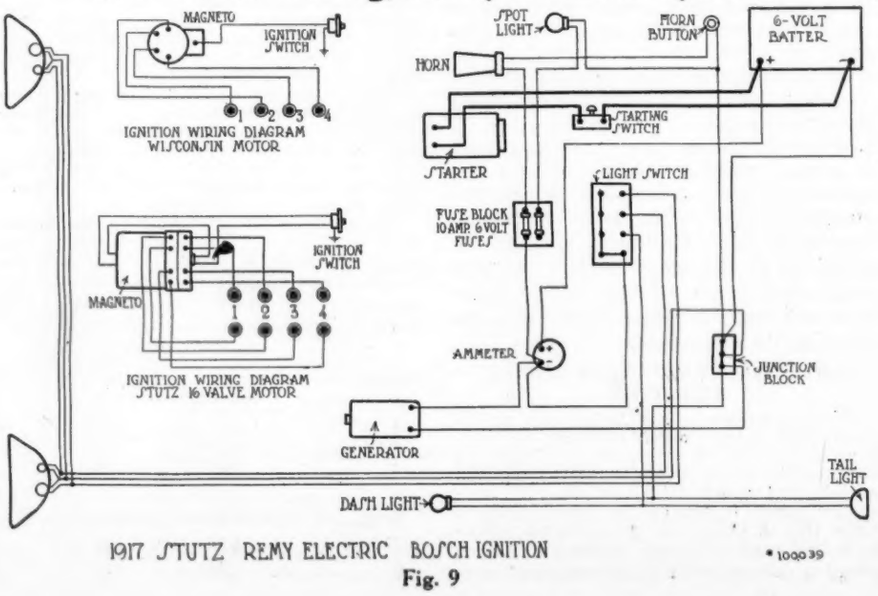


Fig. 9

TESTING CADILLAC 59 DELCO IGNITION COIL

1—Publish the power curve for a 1916 model 53 Cadillac engine.

2—Explain the best method of testing an ignition coil for a model 59 Cadillac. Also publish internal diagram.—C. M. Lanning, New York City.

1—See Fig. 12.

2—The internal diagram of this coil is shown in Fig. 10. Aside from testing the coil in connection with the rest of the system by snapping the breaker points open and closed with the fingers and noting the quality of the spark at the plugs, the only simple method is that of using two test points arranged in series with a 110 volt lamp, using current from the commercial lighting circuit. This latter method will determine whether either the primary or secondary windings are open but will not indicate whether they are short circuited. A very good method of detecting the latter fault is known as the bridge test. In this the suspected coil is compared with the one that is known to be normal, the difference in the current passed by each being measured by a galvanometer or a low reading voltmeter. An explanation of the bridge test together with simple diagrams of the necessary apparatus appears on the first page of this section.

ENGINE OVERHEATS BADLY

A 490 Chevrolet boils the water in the radiator easily. We have checked up on the timing and oil pump and find everything all right. Give idea as to trouble. —Wilson Garage, Rural Hall, N. C.

Have you tried tightening the fan belt? A loose fan belt causes much trouble on this car for the reason that it also drives the pump and if there is slippage there is a loss of efficiency in two places. It might also be well to clean the whole system thoroughly with washing (not baking) soda solution, boiling it for several minutes with the engine running, the spark retarded and the radiator blocked up to prevent circulation of the air. Flush out with clean water afterwards for at least an hour or, preferably, two or three hours.

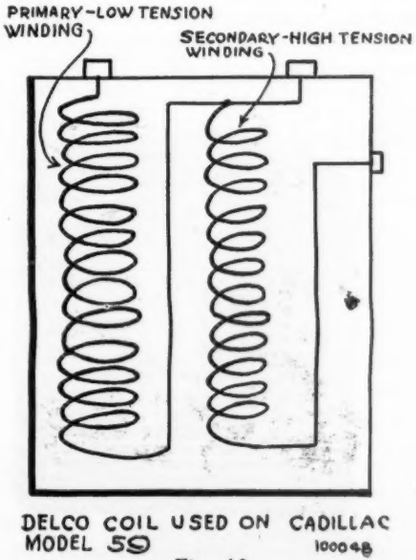


Fig. 10

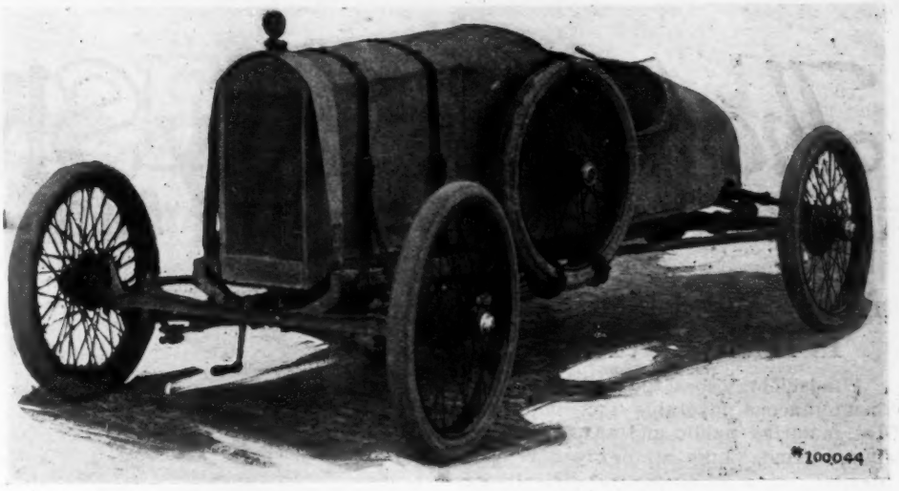


Fig. 11—An example of Ford underslinging

"HOT SPOTTING" A WATER JACKETED MANIFOLD

Q—We are trying to better the performance of a 1918 Model Reo Six, which has a water jacketed intake manifold. Would it be advisable to connect one of the water pipes to the exhaust manifold and thus make a gas heated intake manifold? Would this improve the performance of the car on law grade gasoline?—Thomas H. Heffner, Lock Haven, Pa.

We would advise that this experiment be tried. It can do no harm and may lead to interesting development. It will be necessary to connect another pipe to the water outlet orifice of the jacket and run it down below the level of the engine splash for the reason that the exhaust gases coming from the exhaust manifold and passing through the water jacket must have a free outlet outside the hood.

Some experimentation will be needed to determine the proper volume of exhaust gases to pass through the water jacket. For this reason it will be well to place some sort of a valve between the exhaust manifold and the intake manifold. If the latter is highly heated, volumetric efficiency will be interfered with and the power of the engine reduced accordingly.

UNDERSLINGING FORD CHASSIS

Q—Explain how to undersling a Ford. —Chas. Nighswonger, Perry, Ill.

Fig. 11 is a splendid example of Ford underslinging. Although any first class blacksmith can forge the necessary special spring perches it will be better to purchase these from some reputable concern which makes a specialty of such parts. The Speedway Engineering Co., Indianapolis, Wm. Dominick & Co., 2220 Indiana Ave., Chicago, and the Ford Speed Power Equipment Manufacturers, 250 West 54th Street, New York City, will be pleased to supply you with full information regarding their products and the best method of installation.

WORKING OUT THE TIMING OF A "LITTLE" ENGINE

Q—Tell how to time a four cylinder "Little" motor. The camshaft is out of time and there are two sets of dots on the gear of the camshaft. Should the exhaust valve open just before the piston starts upon the return strike or about one-half inch before it gets on dead center?—Fred Murchison, Farmersville, Tex.

It is quite likely that one of the sets of marks is correct and it should not be difficult to determine which one. The exhaust valve should begin to open between 35 and 50 before the piston reaches the bottom dead center and should be closed at exact top dead center or from 5 to 10 degrees past.

With these figures as a starting point mesh the gears and compare the marks. One set will be matched within two teeth either way. This will be the correct set. Unmesh the gears and remesh using the marks which the rough setting has shown to be correct. This should give the correct timing. Obliterate the false marks and mark the true ones in such a way that there can never be any doubt of them in the future.

PROPER REPAIR OF INNER TUBE VALVE

Q—In repairing an inner tube around the valve stem which is best: to pull the stem out of tube or remove the nut and push the stem inside? Does it injure the tube to pull the stem out and insert from the outside?—Binggele & Wren, Steedman, Mo.

It is better to push the valve stem down inside the tube; this for the reason that it makes the job easier and does not unduly strain the hole.

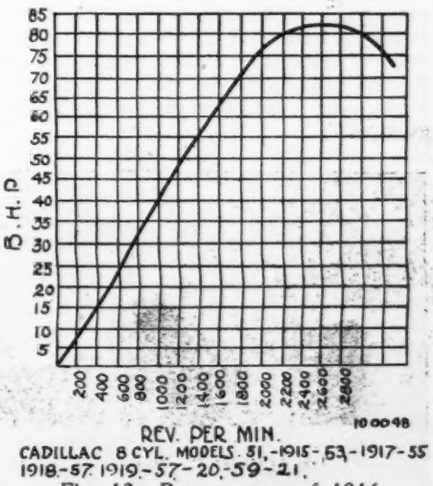


Fig. 12—Power curve of 1916 Cadillac engine

The Accessory Show Case

New Fitments for the Car

Acme Windshield Visor Is Easily Attachable

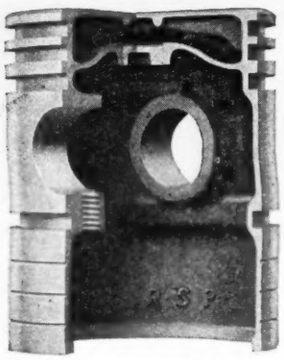
Windshield visors have met with an instantaneous favorable reception from the motoring public and are in increasing demand. Like all newly developed devices many of them are difficult for the general run of service stations to attach. The Acme Motor Shield Corp., Baltimore, Md., manufacturers of the Acme Visor, claim to have overcome this difficulty in the construction of the device manufactured by them, by so designing it that it will attach to the top of 90 per cent of the windshields on the market.

A further claim for the superiority of the device is that the method of attachment eliminates interference with the car top. Made of high grade top material, black outside with a green lining for eye protection, the visor can be extended or rolled up in the same manner as a window shade. This design eliminates all small metal pieces other than those which are solidly clamped to the windshield frame; therefore, there are no troublesome parts to work loose and rattle.

The Georger Traffic Signal

A high grade intention indicator showing whether the operator of the car intends to stop, or turn right or left is the Georger Auto Traffic Signal, marketed by C. H. Georger, 639-641 Main St., Buffalo, N. Y. The control buttons of the apparatus are attached by means of a bracket to the steering column directly underneath the steering wheel within easy reach of the driver. From each of the four buttons control wires lead to the four semaphore signals of the device. By this construction all electrical apparatus and complicated wires are eliminated.

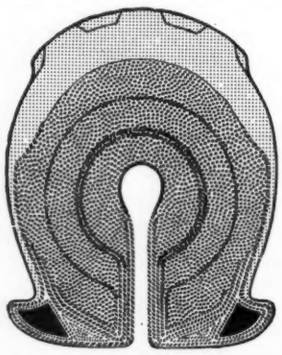
Georger traffic signal



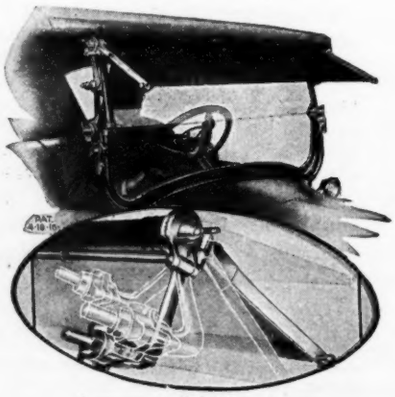
Rich vacuum piston

Liberty Airless Tire

From 25,000 to 30,000 miles without puncture, blowout or other trouble is the claim made by the Liberty Airless Tire Corp., of Carey, O., for the airless type of tire manufactured by them. The device is described as a tubeless cushion tire of high resiliency, composed wholly of rubber and fabric, and with a small central cavity to further increase easy riding. The new tire looks like a pneumatic and is interchangeable with any pneumatic, size for size. Tested side by side with a properly inflated pneumatic tire it is said to be fully as resilient.



Liberty airless tire



Acme windshield visors

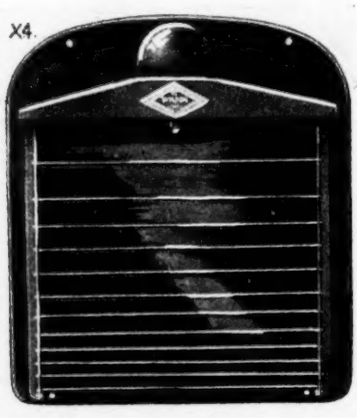
Wilson Automatic Radiator Protector

A radiator protector which may be quicky installed on the radiator of any car, is claimed to be so delicately controlled by a simple thermostat in the top that the shutters will respond to very slight changes in the temperature of the cooling water. As the water becomes hot the shutters open, allowing a greater draft of air to pass through the radiator, while, as the water falls in temperature as on a cold day, the shutters automatically close.

Finished in black enamel the device is highly ornamental adding greatly to the appearance of any car upon which it is applied. Known as the Wilson Automatic Radiator Protector, the device is manufactured by the Automatic Radiator Protector Co., Inc., 2409 Humboldt Ave., So. Minneapolis.

Rich Light-Weight Vacuum Piston

A new light weight piston with a vacuum chamber cast integral in the head is the offering of the Rich Steel Products Co., Los Angeles, Calif. Designed to meet the demand for a light weight, properly aged, and correctly machined part, the new piston is said to fulfill all requirements while the vacuum interior chamber acts as an insulator to prevent the radiation of heat from the top of the head to the interior. This, it is claimed, does much to prevent the burning, cracking and carbonizing of cylinder oil, thus effecting a marked economy.



Wilson automatic radiator protector

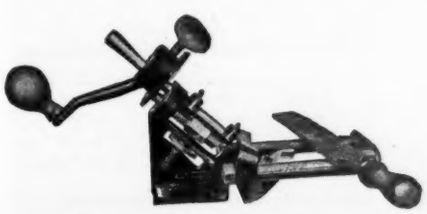
Service Equipment
Time Savers for the Shop

Dilutometer Shows Condition of Crankcase Oil

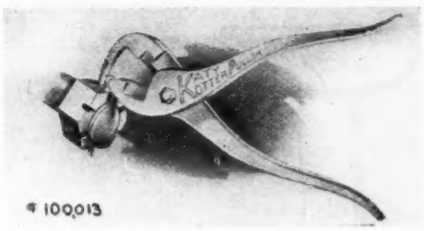
After having made exhaustive test of the crankcase oil in several thousand cars the Larcliff Products Co., 1464 E. 57th st., Chicago, have evolved the "Dilutometer," a simple little instrument, which, upon being immersed in a sample of oil, indicates to what degree it has been contaminated by the heavy portions of the fuel which have passed the pistons and rings. The device is made like the hydrometer tester for measuring the gravity of storage battery solution, and is used in the same way with the exception that surrounding the stem of the float is a sleeve which may be moved up and down. The sleeve is made of celluloid and is lithographed with the words "Danger," in red letters, "Poor," "Fair," "Good," and "New Oil Line."

With the instrument a chart is supplied which shows to which graduation on the float stem the sleeve is to be set when measuring the various brands and grades of oil. The reason for this is a variation in the gravity of the various brands and grades which must be taken into consideration when the investigation is made. For instance, in comparing two popular brands of oil it is found that the light grade of one is equivalent to the medium grade of the other. Too much on the subject of crankcase oil dilution cannot be said, and any device or test which will determine to what extent the lubricant has been diluted will do much to improve service conditions throughout the country.

It is said that the dilutometer frequently shows that an engine is operating on a lubricant which consists of from 35 to 47 per cent kerosene or other of the heavy unburnable end products of the fuel. Though the dilutometer was primarily designed for use of the indivdual motorist it has been found that its wider field of usefulness is the oil supply station and repair shop. Only a moment is required for the oil supply station attendant or repairshop mechanic to draw off a sample of the crankcase oil and, with the aid of the device, show the car owner to just what extent his oil is diluted, and also demonstrate to him the difference in gravity and body between fresh oil and the contaminated mixture which is permitting the insiduous but none the less fatal sapping of the life of his engine by needless friction.



Skinner valve refacing tool



Katy Kotter Puller

Skinner Valve Refacing Tool

The Skinner reseating and refacing tools made by the M. D. Skinner Co., 558-62 Washington Blvd., Chicago, are claimed by the manufacturers to possess several points of superiority, among others the arrangement of the cutter blades of the reseating tool. These are so designed that the cutting edges are at all times parallel, which fact results in a shearing rather than a scraping cut.

The cutting element of the refacing tool consists of a special hard file, one side of which is course for roughing cuts and the other side fine for finishing. The manufacturers claim that the file is the best tool with which to perform the operation for the reason that should one of several of the teeth become broken there are still enough whole ones left to insure a smooth job. The refacing tool may be adjusted to the various valve angles to insure the seats being of the correct angularity.

Larcliff dilutometer

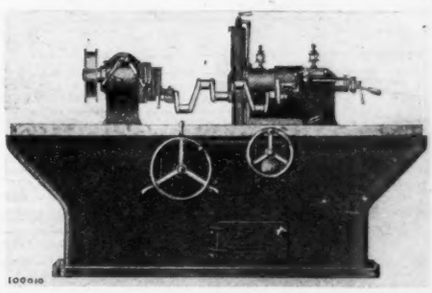
Fitchburg Grinder Trues Round Parts Quickly

Believing that service station executives are alive to the fact that it is useless to attempt to fit a bearing to out of round parts such as wrist pins, crankshaft main and crankpin bearings, spring bolts, axle shafts, driveshafts, and the like, the Fitchburg Grinding Machine Company, Fitchburg, Mass., is supplying the model "N" Fitchburg Cylindrical Grinding Machine, especially designed for the truing up of such parts. For the grinding of crankpins a set of universally adjustable throw-blocks are supplied. With the crankshaft secured in these any of the crankpins can be quickly centered.

The machine is of ample dimensions to accommodate the largest of units. Illustrative of this is the fact that the maximum distance between the centers is 60 inches and the maximum swing is 16 inches. Two grinding wheels, one 14 in. in diameter with a 2 in. face and the other 24 in. in diameter with a 1 in. face are supplied with the outfit. All feeds are by hand to eliminate any chance of the wheels being forcibly jammed into the work at the end of a short travel. Priced at $2,000, the highly versatile outfit is supplied with overhead countershaft, pulleys, and clutches.

The Katy Kotter Pin Puller

Those mechanics who have innumerable times battled with refractory, bent and twisted cotter pins will welcome the advent of the Katy Kotter Puller, a handy little tool selling at $1.40 offered by the Katy Tool Mfg. Co., 908 E. Lake st., Minneapolis. Somewhat resembling the familiar type of combination plier, the tool has one jaw ending in a sharp point which is inserted into the cotter pin eye. The other jaw is elongated at right angles and rests upon the nut during the pulling operation. To use, the point is inserted into the cotter pin eye and, with the device opened, the elongated jaw is rested upon the nut. Closing the handles pulls the pin easily.



Model "N" Fitchburg cylindrical grinding machine

Automotive Repair Shop
Practical Maintenance Hints

Silencing the Overhead Engine Valve

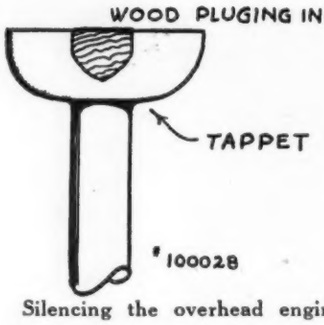
All motorists enjoy a silent engine under the hood, but the tell-tale "tap-tapper-tap" of the overhead valves is hard to avoid except by continual adjustments. There must be clearance enough to permit the slight expansion due to the heating of the parts, and if the rocker arms and tappets are adjusted so that there is no play, there is a likelihood of the valves not seating readily. This results in excessive carbonizing of the rims of the valves and when particles of carbon adhere it means a frequently recurring grinding of the valves.

A simple method which has proved satisfactory and which may be performed in any shop is shown in the illustration. Each of the heads of the valve tappets are drilled out with a five sixteenths inch drill to a depth of one-quarter inch or to such depth as may be reached without weakening the structure.

Plugs are then carefully cut out from hardwood with a conical end just big enough to fit tightly in the holes drilled. The tops of the plugs are then cut off flush with the top of the tappet and these replaced.

It may be well to scar the sides of the holes slightly in order that the plugs will not work out easily.

Before starting the engine, drop a little oil on each plug. This not only decreases wear, but swells the plug slightly so that it becomes wedged in tighter than ever. The noise from an engine with the tappets thus arranged will be scarcely noticeable.



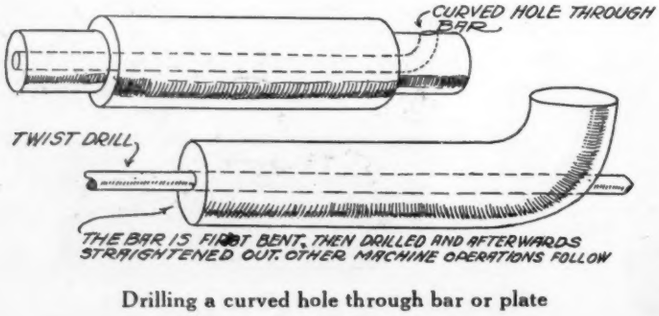
Silencing the overhead engine valve

A Simple Lathe Center Lubricator

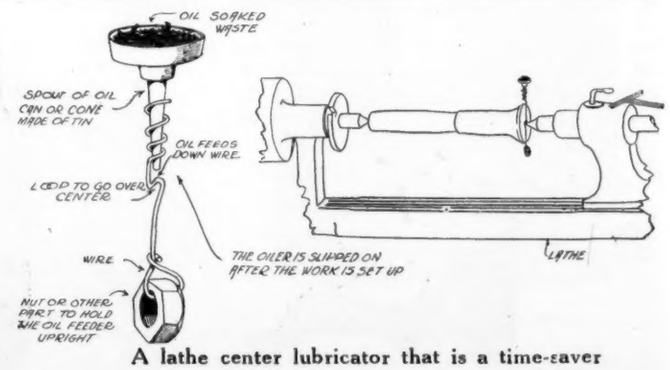
The oil feeder shown in the accompanying illustration, while a simple, easily made device, will relieve the machinist from the constant oiling of the lathe tail stock center when taking long cuts. It is made from a piece of wire, coiled and bent as shown, soldered to an old oil can spout or a small cone. With the job in place in the machine the oiler is hung on the center by means of the loop. A nut, or any heavy object, attached to the lower end of the wire keeps the device upright. The oil with which the wad of waste in spout or cone is saturated feeds by gravity and, dripping down onto the wire, is led by it to the center-point.

Drilling a Curved Hole Through Bar or Plate

One of the unusual jobs which the mechanic sometimes encounters is the drilling of a curved hole through a plate or bar. This may be for purposes of oiling, steam ducts or for special machinery. The method of accomplishing this, shown in the attached drawing, is simple if the part will permit of heating and bending. It involves bending the part prior to the drilling, and then simply a straight drilling operation. Once the hole is drilled, the part is heated and restored to its original shape. An otherwise difficult operation is thereby solved in a manner which is quite simple.



Drilling a curved hole through bar or plate



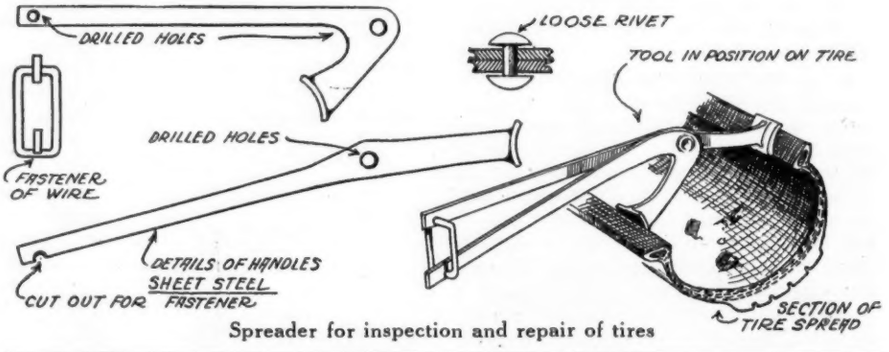
A lathe center lubricator that is a time-saver

Spreader for Inspection and Repair of Tires

The tire repairer will find the tool shown in the illustration below of especial help in spreading the beads of a tire and holding them open while patching, cementing or inserting a section of fabric. This is a quick acting tool which will open the beads of the heaviest tire while an inspection of the inner surface of the fabric is being made.

The tool can be made from eighth inch sheet steel, fastening clip made from round wire, and a rivet through these two tong-like grips.

The edges which engage the beads of the tire are bent, as shown in the sketch, to give a flat face where they fit over the beads. To use tool, one handle is raised to bring the jaws together; it is then placed in the tire and the handles brought together. The fastener is then slipped into position and locks in the notched handle. The repairman who goes to the small amount of work necessary to cut and fit the two sheet metal handles together will find this small compact spreader a time and temper saver with which he would not part.



Spreader for inspection and repair of tires

Fan Belt Sizes and Types
1921 Passenger Cars

Motor Age Maintenance Data Sheet No. 158

One of a series of weekly pages of information valuable to service men and dealers—save this page

Name and Model	Type of Belt	Width	Length	Degree of Angle
Ace, TL	Flat	1⅛	36	.....
Allen, 43	Flat	1¼	29⅞	.....
American Six, C6	Flat	¾	33¾	.....
Anderson, S40	Flat	1¼	32⅞	.....
Apperson, 821	Flat	1¾	39⅛	.....
Auburn, 6-39	Flat	1¼	31	.....
Beggs, 2OT	Flat	1¼	31	.....
Bour Davis, 21S	Flat	1¼	37	.....
Brewster, 91	Chain driven	.....	.....	.....
Briscoe, 4-34	Flat	1	34¼	.....
Buick, 1921	Flat	1¼	30⅛	.....
Cadillac, 59	Gear and Friction Disk			
Case, V	Vee	¾	40	60
Chalmers, 35C	Flat	1¼	37¾	.....
Chandler	Flat	1	32⅛	.....
Chevrolet, 490	Flat	2 1/32	.....	.....
Chevrolet, FB	Flat	⅝	34¼	.....
Cleveland, 40	Vee	⅝	42	38
Climber, S & K	.....	1	17½	.....
Cole Aero, S870	Vee	¾	44	.....
Columbia Six	Flat	1¼	32	.....
Commonwealth, 44	.....	⅞	34	.....
Crawford, 21-6-40	Vee	¾	40	.....
Crow-Elkhart, L55	Flat	¾	30	.....
Cunningham, V 4	Gear driven	.....	.....	.....
Daniels, D19	Vee	¾	45¾	.....
Davis, 51-57	Flat	1¼	36½	.....
Dodge Bros	Flat	1	22	.....
Dort	Flat	1⅛	31	.....
Dort-Export	Flat	1⅛	32	.....
Dixie Flyer, HS7000	Flat	⅞	33	.....
Dorris, 6-80	Flat	1	40⅜	.....
DuPont, A	Flat	1	33¾	.....
Elcar, Six	Flat	1¼	32	.....
Elcar, Four	Flat	1	30¾	.....
Elgin, K	Flat	1	37⅞	.....
Essex, A	Flat	1	41½	.....
Friend Four	Flat	¾	44	.....
Ferris, C21	Vee	⅝	43	30
Franklin, 9B	No fan used	.....	.....	.....
Ford, T	Flat	1⅛	26 2/5	.....
Gardner, G	Flat	1	31½	.....
Geronimo, 6E45	Flat	¾	32	.....
Hanson Six, 54 and 60	Flat	1½	30	.....
Hatfield, N12	Flat	1	33	.....
Haynes, 48	Flat	⅞	34 11/16	.....
Haynes, 47	Flat	¾	34½	.....
Holmes, 1921	None used	.....	.....	.....
Hudson Super Six, 0	Flat	1	34⅞	.....
Hupmobile, R5	Vee	⅝	24 19/32	45
Jackson	Flat	1¼	33⅝	.....
Jordan, M	Flat	1¼	31 5/32	.....
Kenworthy, 6-55	Vee	.....	36½	60
Kissel	Flat	1	34 9/16	.....
Kline Kar, 6-55K	Flat	1¼	35	.....
LaFayette, 134	Chain driven	.....	.....	.....
Leach-Bitwell	Vee	¾	43	.....
Lexington, S	.....	1¼	34¾	.....
Liberty, 10C	Flat	1¼	40½	.....
Lincoln	Vee	1	33¼	45
Locomobile, S7	Vee	¾	53¼	.....
Maibohm, B	Flat	1	37	.....

Name and Model	Type of Belt	Width	Length	Degree of Angle
Marmon, 34	Vee	¾	44	.....
Maxwell, 25	Flat	1½	44¼	.....
McFarlan, 147	Vee*	¾	40½	.....
Mercer, S5	Flat	1	32½	.....
Meteor, R and RR	Flat	1¼	39⅝	.....
Metz, M Six	Flat	¾	33	.....
Monitor	Flat	1	37¼	.....
Moon, 6-68	Vee	¾	39	.....
Moon, 6-48	Flat	.....	31	.....
Monroe, S9 and 10	Flat	1¾	44¼	.....
Nash, 681-2	Vee	¾	42	.....
National Sextet	Flat	1¼	38½	.....
Nelson, E	Flat	1¼	30	.....
Noma, 1C	Flat	1¼	32½	.....
Norwalk, 430, ES	Flat	¾	29	.....
Oakland, 34C	Vee	⅝	30¼	.....
Oldsmobile, 46	Vee	¾	44½	.....
Packard Six	Vee	¾	49½	45
Packard Twin Six	Vee	¾	45	28
Paige, 6-66	Flat	1¼	32⅜	.....
Paige, 6-42	Flat	1	36½	.....
Paterson, 650	Flat	1⅛	31½	.....
Peerless, 56, S6	Gear driven	.....	.....	.....
Piedmont, 4-30	Flat	¾	31	.....
Piedmont, 6-40	Flat	¾	40½	.....
Pierce Arrow, 38	Vee	⅝	38 21/32	.....
Pierce Arrow, 48	Vee	⅝	38 21/32	.....
Pan, A	Flat	1¼	36¼	.....
Pilot, 645	Vee	¾	32	.....
Porter, 46	Round	⅜	36	.....
Premier, 6-D	Vee	¾	39	.....
Ranger, B	Flat	1¼	31	.....
Reo, T6 and U6	Vee	9/16	35	.....
ReVere Series F	Flat	1	31	.....
Roamer, C6-54	Vee	⅝	37¾	.....
Roamer, D4-75	Flat	1¼	30⅜	.....
Rock Falls, 12	Flat	1¼	39	.....
R & V Knight, J	Vee	⅝	34¾	.....
Saxon, 125	Flat	¾	39 13/32	.....
Sayers Six DP	Flat	1¼	34½	.....
Scripps Booth, B39	Vee	⅝	30½	.....
Seneca, L-20	Flat	¾	32	.....
Severin	Vee	¾	45	.....
Skelton, 35	Flat	1	32¼	.....
Sheridan, B40-3	Vee	21/32	32½	.....
Standard "8" 1	Gear driven	.....	.....	.....
Stearns Knight SKL4	Flat	1	36¾	.....
Stephens, Six S, 80	Vee	⅝	34½	.....
Stephens-Duryea, E	Flat	1⅛	47½	.....
Studebaker, EH	Flat	¾	33¼	.....
Studebaker, EJ	Flat	¾	25¾	.....
Studebaker, EG	Flat	¾	33¼	.....
Stutz	Flat	⅞	36	.....
Templar, 445	Flat	1½	30⅝	.....
Texan, A, B-38	Flat	1	33½	.....
Tulsa, EI-2-2	Flat	⅞	31	.....
Velie, 34	Flat	1	39	.....
Velie, 48	Flat	1¼	30½	.....
Westcott, C3	Flat	1¼	65 13/16	.....
Westcott, C-48	Vee	¾	45	.....
Winther Six	Flat	1¼	34 15/16	.....
Winton, 25	Vee	⅝	36 15/16	.....
Wasp, 211	Flat	1¼	31	———

*Built up style of belt.

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....G	Guy..	6-3¼x5	123	32x4	$2975	$2975	....	$3680	$3680
Ace.....H	H-S..	6-3⅜x5	123	32x4	2975	2975	....	3680	3680
Ace.....L	H-S..	4-3¼x5	116	32x4	2260	2260	....	....	....
Allen.....Series 43	Own..	6-3½x5	110	32x4	‡1385	1385	....	....	2195
Ambassador.....R	Cont..	6-3⅜x5¼	136	33x5	....	†4500	$4500	....	6500
American.....C	H-S..	6-3¼x5	127	32x4	2195	2275	†2350	....	3150
Anderson.....Series 40	Cont.	6-3¼x4½	120	33x4	2195	1795	1845	2795	2795
Apperson.....8-21-S	Own..	8-3½x5	130	34x4½	....	†3500	3500	4500	4500
Apperson...Anniversary	Own..	8-3½x5	130	34x4½	....	†4250	4250	....	....
Auburn.....6-39	Cont..	6-3¼x4½	120	33x4	....	1695	†1695	2795	2795
Beggs.....20T	Cont..	6-3¼x4½	120	33x4	1775	1775	....	2675	2775
Bell.....4-32	H-S..	4-3½x5	114	31x4	....	1495	....	....	....
Bell.....6-50	H-S..	6-3¼x5	124	32x4	....	1695	....	....	....
Biddle.....B1	Buda	4-3⅜x5½	121	32x4	3475	3475	....	....	3975
Birch Super-Four	H-S..	4-3½x5	117	33x4	1345	1345	†1395	2295	2295
Birch Light Four	LeR..	4-3½x4½	108	30x3½	1195	1195	....	....	....
Birch Light Six	H-S..	6-3¼x5	117	33x4	1595	1595	....	....	....
Bour-Davis.....21S	Cont..	6-3½x5¼	126	33x4½	†2385	†2385	2385	....	....
Brewster.....91	Own..	4-4 x5½	125	32x4½	†7000	7000	....	....	10500
Briscoe.....4-34	Own..	4-3⅜x5	109	31x4	1085	1085	....	1685	1685
Brook.....S-21 A	Own..	2-3½x3⅜	90	28x3	395	....	....	....	....
Buick.....1922-44-5-6-7	Own..	6-3⅜x4½	118	33x4§	1495	1525	....	2135	2435
Buick.....1922-48-9-50	Own..	6-3⅜x4½	124	34x4½	....	....	1735	2325	2635
Bush.....E.C.4	Lyc..	4-3½x5	116	33x4	....	1245	....	....	....
Bush.....E.C.6	Rut..	6-3½x5	116	33x4	1295	1575	....	2050	2150
			125	34x4½	3790	†3790	....	....	4950
Cadillac.....59	Own..	8-3½x5⅛	132	35x5	....	....	3940	....	5190
Carroll.....C	Roch..	6-3½x5	128	....	3985	3985	....	....	....
Carroll.....D	Roch..	6-3½x5	128	....	3185	3185	....	....	....
Case.....V	Cont..	6-3½x5¼	126	34x4½	....	†2650	2650	3400	3750
Chalmers.....6-30	Own..	6-3¼x4½	117	32x4	1495	1545	....	2295	2445
Chalmers.....6-30	Own..	6-3¼x4½	122	33x4½	....	....	1795	....	....
Champion.....Tourist	Lyc..	4-3½x5	113	32x3½	....	1095	....	....	....
Champion.....Special	H-S..	4-3½x5	118	32x4	†1395	1395	....	....	....
Chandler.....Six	Own..	6-3½x5	123	33x4	1785	†1785	1785	2785	2885
Chevrolet.....490	Own..	4-3⅛x4	102	30x3½	635	645	....	1155	1195
Chevrolet.....FB	Own..	4-3⅛x5¼	110	33x4	1185	1185	....	1885	1885
Cleveland.....40	Own..	6-3 x4½	112	32x4	1295	1295	....	2195	2295
Climber Four	H-S..	4-3½x5	117	....	1450	1385	....	....	....
Climber Six.....S	H-S..	6-3¼x5	125½	32x4½	2250	2250	....	....	....
Cole.....870	Nort.	8-3½x4½	127	33x5	2795	†2550	2695	3995	3995
Columbia.....D-C&CS	Cont.	6-3¼x4½	115	32x4	1795	1795	....	2495	2595
Comet.....C-53	Cont.	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Commonwealth.....44	H-S..	4-3½x5	117	32x4	....	1595	....	....	2465
Crawford.....21-6-40	Cont.	6-3½x5¼	122½	32x4	3000	3000	....	....	4500
Crow-Elkhart....L63-65	Lyc..	4-3½x5	117	32x3½	‡1295	1295	....	....	....
Crow-Elkhart....S63-65	H-S..	6-3¼x5	117	33x4	‡1545	1545	....	....	2395
Cunningham.....V-4	Own..	8-3⅜x5	142	35x5	....	....	....	....	....
Daniels.....D-19	Own..	8-3½x5¼	132	34x4½	‡5350	†5350	5350	6250	6950
Davis.....61-67	Cont.	6-3¼x4½	120	33x4	†1995	1895	†2150	2795	2795
Dispatch	Wisc..	4-3¾x5	120	34x4	1250	1350	1350	1525	1575
Dixie Flyer.....H-S-70	H-S..	4-3½x5	112	32x4	1445	1445	....	2295	2345
Dodge Brothers	Own..	4-3⅞x4½	114	32x3½	935	985	....	1585	1785
Dorris.....6-80	Own..	6-4 x5	132	33x5	....	†4785	4785	5800	6090
Dort.....17-12	D-Ly	4-3½x5	108	31x4	985	985	....	1535	1685
Dupont.....A	Own..	4-3⅛x5½	124	32x4½	3400	†3400	....	....	4900
Elcar.....K-4	Lyc..	4-3½x5	117	33x4	1300	1300	....	....	2600
Elcar.....7-R	Cont.	6-3¼x4½	117	33x4	‡1700	1700	....	2500	2600
Elgin.....K-1	Falls.	6-3⅜x4¼	118	33x4	†1595	1495	....	2395	2395
Essex	Own..	4-3⅜x5	108½	32x4	1445	1445	....	1950	2300
Fergus.....S-5-21	Own..	6-3¼x5	126	33x4½	....	Chassis Price		8500	....
Ferris	Cont.	6-3½x5¼	130	32x4½	3350	....	*3350	....	4100
Ford.....T	Own..	4-3⅜x4	100	30x3½	**370	††415	....	695	760
Franklin.....9-B	Own..	6-3¼x4	115	32x4	2550	2650	2550	....	3650
Friend.....Four	Own..	4-3¼x4½	112	32x3½	‡1285	1285	....	1985	2085
Gardner.....G	Lyc..	4-3½x5	112	32x3½	‡995	‡995	....	....	2145
Globe.....B-10	Supre.	4-3⅜x5	115	32x4	....	....	....	....	....
Grant.....Six	Own..	6-3½x4½	116	32x4	1550	1550	....	2450	2450
H.C.S	Weid.	4-3⅝x5½	120	32x4½	2025	†2975	....	3650	3850
Halladay.....21	Rut..	6-3½x5	116	33x4	....	1985	....	....	....
Handley-Knight	Kn'ht.	4-4½x4½	125	32x4½	....	....	2850	....	4185
Hanson Six.....60	Cont.	6-3¼x4½	121	32x4	2185	2185	†2285	....	3165
Hanover Light	Own..	2-3½x4	190	28x3	345	....	....	....	....
Harroun.....A-A-2	Own..	4-3¼x5¼	106	30x3½	....	1195	....	....	....
Hatfield.....A-42	H-S..	4-3½x5	115	32x4	1495	1495	....	....	2395
Haynes.....47	Own..	6-3½x5	132	34x4½	3500	†2935	2935	....	4250
Haynes.....50	Own..	6-3½x5	121	33x4	....	1985	....	....	....
Haynes.....48	Own..	12-2⅞x5	132	34x4½	4200	†3635	3635	....	4950
Huffman.....R	Cont.	6-3¼x4½	120	32x4	1845	1795	....	....	2775
Holmes.....Series 4	Own..	6-3½x4¼	126	34x4½	†3350	....	3350	4250	4550
Hudson Super 6	Own..	6-3½x5	126	34x4½	†2250	....	2250	3125	3250
Hupmobile.....Series R	Own..	4-3¼x5½	112	32x4	1485	1485	....	2400	2485
Jackson.....638	Cont.	6-3¼x4½	121	32x4½	†2685	1950	....	3760	3760
Jordan.....M	Cont.	6-3¼x4½	120	32x4	2250	2250	....	3300	3300
Jordan.....F	Cont.	6-3½x5¼	127	32x4½	....	....	2475	....	3700
Kenworthy.....8-90	Own..	8-3 x5¼	130	32x4½	5000	5000	5250	6000	6000
Kessler.....K	Own..	4-3¾x3¾	117	32x4	....	1995	....	....	2445
King.....J	Own..	8-3 x5	120	32x4½	2740	†2725	*2725	....	4035
Kissel.....45	Own..	6-3⅞x5½	124	32x4½	....	2775	†2975	3775	3775
Kline Kar.....6-55-K	Cont.	6-3¼x4½	121	33x4	2290	2290	2290	3250	3290
Kurtz Automatic.....A	H-S..	6-3¼x5	122	32x4	....	2250	....	....	3000
LaFayette.....134	Own..	8-3½x5¼	132	33x5	4850	4850	4850	6250	6500
Leach.....21-A-B&C	Cont.	6-3½x5¼	128	32x4½	§5700	5200	5700	....	....
Lexington.....Series S	Cont.	6-3¼x4½	122	32x4	....	1885	....	2750	3150
Lexington.....Series T	Anst.	6-3¼x4½	128	32x4½	....	....	2785	....	3750
Liberty.....10-C	Own..	6-3½x5	117	32x4	1595	1595	†1675	2400	2495
Lincoln	Own..	8-3⅜x5	130	33x5	4300	4300	4300	4950	5400
Locomobile	Own..	6-4½x5½	142	35x5	....	†8600	8600	....	....
Lorraine.....21-T	H-S..	4-3½x5	114	32x4	1665	1665	....	2590	2590

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maibohm.....B	Falls..	6-3½x4¼	116	32x4	‡1575	$1575	†1750	$2395	$2395
Marmon.....34	Own..	6-3⅜x5⅞	136	32x4½	4185	†3985	3985	4875	5275
Maxwell.....25	Own..	4-3⅛x4½	109	30x3½	845	845	....	1445	1545
McFarlan.....1921	Own..	6-4½x6	140	33x5	6300	†6300	6300	7500	7500
Mercer.....Series 5	Own..	4-3¾x6¾	132	32x4½	4500	†4500	*4500	5700	6200
Merit	Cont..	6-3¼x4½	119	32x4	2245	†2245	....	....	....
Meteor.....R&RR	Dues..	4-4½x6	129	32x4½	5500	5500	....	....	....
Metz.....M6	Rut..	6-3½x5	120	32x4	1995	1995	....	2795	2895
Mitchell.....F-40	Own..	6-3¼x5	120	33x4	‡1490	1490	†1790	2590	2690
Mitchell.....F-42	Own..	6-3½x5	127	33x4	....	....	1995	....	....
Moller.....A	Own..	4-2⅝x4	100	27x3½	2000	....	....	....	....
Monroe.....S-9 & 10	Own..	4-3¼x4½	115	32x3½	1295	1295	....	....	....
Monroe.....S-11 & 12	Own..	4-3¼x4½	115	33x4	....	....	....	2075	2175
Moon.....6-48	Cont..	6-3¼x4½	122	32x4	2085	1985	2485	2985	2985
Murray-Mac Six	Own..	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash.....681-7	Own..	6-3¼x5	121	33x4	1525	1545	†1695	2395	2695
Nash.....682	Own..	6-3¼x5	127	34x4½	....	....	1695	....	....
Nash Four.....41-4	Own..	4-3¼x5	112	32x3½	1175	1195	....	1735	1935
National Sextet.....BB	Own..	6-3½x5¼	130	32x4½	2990	†2990	2990	3990	3990
Nelson.....D	Own..	4-3½x4¾	104	32x4	....	1900	....	....	....
Noma.....1C	Cont..	6-3¼x4½	128	32x4½	3000	†3200	....	....	4450
Northway	Own..	6-3½x5¼	128	33x5	4200	*4200	6000	5600	5400
Norwalk.....430-KS	Lyc..	4-3½x5	116	32x3½	....	1135	....	....	....
Oakland.....34-C	Own..	6-2⅞x4¾	115	32x4	1145	1145	....	1815	1815
Ogren.....6-60	Own..	6-3½x5¼	134	33x5	†3850	3750	3900	5000	5400
Oldsmobile.....43-A	Own..	4-3⅞x5¼	115	32x4	†1325	1345	....	1895	2100
Oldsmobile.....37A	Own..	6-2⅞x4¾	112	32x4	†1450	1450	....	2145	2145
Oldsmobile.....46	Own..	8-2⅞x4¾	122	33x4½	....	†1825	1875	....	2775
Oldsmobile.....47	Own..	8-2⅞x4½	115	32x4	....	††1725	....	2225	2425
Overland.....4	Own..	4-3⅜x4	100	30x3½	695	695	....	1000	1275
Packard.....Single-Six	Own..	6-3⅜x4½	116	33x4½	2975	2975	....	3750	3975
Packard.....Twin Six	Own..	12-3 x5	136	35x5	4850	*4850	4850	6600	6800
Paige.....6-42	Own..	6-3¼x5	119	32x4	1635	1635	1925	2450	2570
Paige.....6-66	Cont.	6-3⅜x5	131	33x4½	2975	‡3295	2875	3755	3830
Pan.....A	Own..	4-3¼x5	108	33x4	....	1500	....	....	....
Pan American.E&F-6-55	H-S..	6-3¼x5	121	33x4	2000	2000	....	....	....
Parenti.....1921	Own..	8-2⅝x4¼	125	32x4	....	2000	....	....	3000
Paterson.....650	Cont..	6-3¼x4½	120	33x4	....	1895	1925	2895	2895
Peerless.....56-S-7	Own..	8-3¼x5	125	34x4½	....	†2990	2990	3680	3950
Peters	Own..	2-3½x3⅜	90	28x3	385	....	....	....	....
Piedmont.....4-30	Lyc..	4-3½x5	116	32x3½	....	1270	....	....	....
Piedmont.....6-40	Cont..	6-3¼x4½	122	32x4	....	1495	....	....	....
Pierce-Arrow	Own..	6-4 x5½	138	35x5	8000	†7500	7500	8500	9000
Pilot.....6-45	Teetor	6-3½x5	120	32x4	1945	1895	....	....	....
Pilot.....6-50	H-S..	6-3¼x5	126	32x4½	2285	2285	2335	3350	3400
Porter.....40	Own..	4-4⅜x6¾	142	35x5	6750	Chassis Price			....
Premier.....6-D	Own..	6-3⅝x5½	126¾	33x5	3790	†3690	3890	4690	5190
Premocar.....6-40 A	Falls..	6-3½x4¼	117	32x3½	....	1295	....	....	....
Raleigh.....A-6-60	H-S..	6-3¼x5	122	32x4½	2250	2250	....	3100	3200
Ranger.....A-20	Own..	4-3⅝x5	116	32x4	....	....	....	....	....
R & V Knight.....R	Own..	4-3⅝x5	116	32x4	....	2150	....	2850	2950
R & V Knight.....J	Own..	6-3½x4½	127	32x4½	3350	†3350	3350	4000	4200
Reo.....T-6	Own..	6-3⅛x5	120	33x4	1850	1850	....	2700	2750
Revere.....C	Dues.	4-3⅝x6	131	32x4½	4850	4650	†4650	....	6500
Roamer.....6-54-E	Cont.	6-3½x5¼	138	32x4½	....	....	....	....	....
Romer	Cont..	6-3¼x4½	120	32x4	2000	2000	2100	2450	2750
Rock Falls.....14000	Cont..	6-3⅜x5	132	35x5	....	....	....	....	....
Rolls-Royce	Own..	6-4½x4¾	143½	33x5	U. S. Chassis Price			11750	....
Saxon.....125	Own..	4-3⅜x5	112	32x4	....	1495	....	2295	2295
Sayers Six.....DP	Cont.	6-3¼x4½	118	33x4	2495	2195	....	....	3295
Scripps-Booth...B-39-42	Nort.	6-2⅞x4¾	115	32x4	‡1275	1295	....	1950	2100
Seneca.....L & O	LeR..	4-3⅜x4½	108	30x3½	1045	1045	....	....	....
Severin.....Six	Cont.	6-3½x5¼	122	33x4	1485	1485	....	2100	2250
Severin.....Six	Cont.	6-3½x5¼	122	33x5	2550	2550	2550	3250	3350
Sheridan.....4	Nort.	4-3⅛x5¼	116	33x4	1485	1485	....	2060	2360
Sheridan.....8	Nort.	8-3½x4½	132	33x5	....	....	....	....	....
Skelton.....35	Lyc..	4-3½x5	112	32x3½	1295	1295	....	....	....
Southern Six.....660-2	H-S..	6-3¼x5	127	32x4½	2875	2875	2995	....	....
Standard.....J	Own..	8-3¼x5	127	34x3½	3400	†3400	3400	4500	4500
Stanley Steamer	Own..	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six	Cont.	6-3¼x4½	118	33x4	2050	2050	....	2950	....
Stearns.....SKL4	Own..	4-3⅜x5⅝	125	34x4½	2550	2450	2675	3400	3700
Stephens.....90	Own..	6-3¼x4½	122	33x4½	1900	†1985	2065	3100	3100
Stevens Duryea.....E	Own..	6-4⅛x5½	138	35x5	8500	†8000	8000	9500	9500
Studebaker.....EJ-40	Own..	6-3⅜x4½	112	32x4	1300	1335	....	1695	1995
Studebaker.....EH-50	Own..	6-3½x5	119	32x4	1585	1635	†1635	2450	2550
Studebaker.....EG-60	Own..	6-3½x5	126	33x4½	....	....	1985	....	....
Stutz	Own..	4-4⅜x6	130	32x4½	3250	†3350	*3350	4850	....
Templar.....A-445	Own..	4-3⅝x5½	118	32x4	2385	2385	....	3185	3185
Texan.....A-38	Lyc..	4-3½x5	115	33x4	1195	1195	....	....	....
Texan.....C-12	H-S..	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa.....E-1-2-3	H-S..	4-3½x5	117½	33x4	1385	1385	....	....	....
Velie.....48	Cont.	6-3¼x4½	115	32x4	1585	1585	†1800	2485	2485
Velie.....34	Falls.	6-3¼x4¼	112	32x3½	1385	1385	....	....	2085
Vogue.....6-55	H-S..	6-3¼x5	124	32x4	....	2285	2360	3050	3050
Vogue.....6-66	Cont.	6-3½x5¼	124	33x4½	....	2485	2560	3250	3250
Washington	Eal's.	6-3⅛x4¼	114	32x4	....	1685	....	....	....
Wasp.....2611	Wisc.	4-4¾x5½	132	33x5	....	†5500	....	....	....
Westcott.....C-48	Cont.	6-3½x5¼	125	32x4½	....	....	2990	....	4590
Westcott.....C-38	Cont.	6-3¼x4½	118	33x4	2290	2290	†2290	3390	3390
Wharton.....A	Curt.	8-4 x5	136	34x4½	....	†4885	4885	....	....
Wills Sainte Claire	Own..	8-3¼x4	121	32x4½	3275	3200	....	....	....
Willys-Knight.....20	Own..	4-3⅝x4½	118	33x4	1895	1895	....	2550	2750
Winther.....61	H-S..	6-3¼x5	120	32x4½	....	....	2750	....	....
Winton.....25	Own..	6-3¾x5¼	132	35x5	4600	†4975	4600	5950	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. +Special Body. **—Price without starter and demountable rims. Price with starter and demountable rims $465. ††—Price without starter and demountable rims. Price with starter and demountable rims $510.

Engine Make: Anst.—Ansted. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming Dues.—Duesenberg. GBS—Golden, Belknap & Swartz. H-S—Herschell-Spillman. LeR Leroi. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenber. Supr—Supreme. Tee—Teetor. Weid—Weidely. Wisc—Wisconsin. §—Model 47—34x4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾	$1650§	3¾x5	34x5†	34x5†	W
Acason, R	1	2260	3¾x5¼	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5¼	36x3½	36x6	W
Acason, H	2½	3295	4⅜x5¼	36x4*	36x4d*	W
Acason, L	3½	4295	4⅜x5¼	36x5*	36x5d*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5⅛	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2	....	4⅛x5¼	36x4	36x7	W
Acme, C	3½	....	4½x5½	36x5	40x10	W
Acme, E	5	....	4¾x6	36x6	40x12	W
Akr'nMulti-Trk20	1	1995	4 x5¼	34x5	34x5	B
All-Power, C	3½	5300	4½x6	36x7	36x10	W
All-American, B-1	1	1795	3½x5	32x4	32x4	I
All-American C-1	1½	2195	3½x5	34x4	34x5	I
American, 25	2½	3350	4 x6	36x4*	36x4d*	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1675	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5½	34x3½	34x4	I
Apex, E	2½	2695	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6*	I
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D	1	....	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2775	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3375	4⅛x5¼	36x4	36x4d	W
Atterbury, 7D	3½	4175	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	5575	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½–2	2300	4¾x4½*	34x4*	34x5*	D
Autocar, 21UG	1½–2	2400	4¾x4½*	34x4*	34x5*	D
Autocar, 26Y	....	4350	4¼x5½	34x5	36x10	D
Autocar, 26-B	....	4500	4½x5½	34x5	36x10	D
Available, H1½	1½	2750	4 x5⅛	36x3½*	36x5*	W
Available, H2½	2½	3475	4 x5⅛	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A. Jr.	1	1800	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell, E	1½	2250	3¼x5¼	34x3½	34x5†	I
Bell, O	2½	2750	4½x5½	34x4	34x7	I
Belmont, D	2	2675	3¾x5	34x3½*	34x6*	D
Belmont, F	3½	3525	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H–2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J–2	2½	2595	4⅛x5¼	36x4	36x4	I
Bessemer, K–2	4	3495	4½x5½	36x6	36x10	I
Bethlehem, K	1	....	3½x5	34x4½†	35x5	I
Bethlehem, G	2	....	4 x5¼	34x3½*	34x6*	I
Bethlehem, H	3	....	4 x5¼*	36x4*	36x8	I
Bethlehem, J	4	....	4½x5½	36x5*	36x5d*	I
Bollstrom, 30	1½	2100	3¾x5¼	34x3½	34x6	I
Bollstrom, 50	2½	2800	4¼x5½	36x4	36x8	I
Bollstrom, 70	3½	3800	4½x6	36x5	36x10	I
Bollstrom, A–20	4	6000	5¾x7	40x8†	40x8†	I
Bollstrom, B21	4	5050	4½x5½	36x7	36x7	I
Bridgeport, A	1½	2350	3¾x5¼	34x3	34x6	W
Bridgeport, B	2½	2850	4¼x5½	36x4*	36x7*	W
Bridgeport, C	4	3650	4½x6	36x5	36x5d	W
Bridgeport, D	6	4500	4½x6	36x6	36x6d	W
Brinton, F	2½	3400	4⅛x5¼	36x4	36x7	W
Brockway, E	¾	1675	3¾x5	35x5†	35x5†	B
Brockway, S–4	1½	2250	3¾x5	36x3½*	36x5*	W
Brockway, K–5	2½	3200	4⅛x5½	36x4	36x7	W
Brockway, R–4	3½	4100	4½x5½	36x5	36x5d	W
Brockway, T	5	5250	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case, ††	2	3000	4¼x5¾	36x6	38.7	I
Champion Light Commercial	1½	1100	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	820	3¼x4	31x4†	34x4½†	B
Chevrolet, T	1	1225	3¼x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5⅛	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A 20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾	1890	3¾x5	34x5	34x5	W
Clydesdale, 32C	1	2375	3¾x5¼	34x3½*	34x5*	W
Clydesdale, 42C	1½	2750	4 x5⅛	36x3½	36x5	W
Clydesdale, 65C	2½	3540	4¼x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3775	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4400	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	5500	4¾x6	36x6	40x12	W
Collier, 18	1	2350	3¾x5	34x4	34x5	W
Collier, 19	1½	2550	3¾x5	36x4	36x6	W
Collier, 21	2	2950	4⅛x5¼	36x4	36x7	W
Collier, 22	2½	3250	4⅛x5¼	36x4	36x4	W
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾–1¼	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Concord, A	1½	2700	4 x5½	36x3½	36x6	W
Concord B	2½	3600	4¼x5½	36x4	36x8	W
Concord AX	1½	3150	4 x5½	36x3½	36x6	W
Concord, BX	2½	3600	4½x5½	36x4	36x8	W
Cook, 41	2	$3000	4 x5½	36x6†	38x7†	I
Corbitt, E	1	2400	3¾x5	34x3½	34x4	W
Corbitt, D	1½	2800	3¾x5	36x3½	36x5	W
Corbitt, C	2	3500	4⅛x5¼	36x3½	36x7	W
Corbitt, B	2½	3650	4½x5½	36x4	36x7	W
Corbitt, A	3½	4500	4½x5½	36x5	36x10	W
Corbitt, AA	5	5500	4¾x6	36x6	40x6d	W
Cyclone	1½	2800	3½x5	34x5†	36x6†	I
Dart, S	1½	....	3¾x5½	34x3½	34x6	W
Dart, M	2½	....	4¼x5½	36x4	36x7	W
Dart, W	3½	....	4½x6	36x5	36x10	W
Day–Elder, A	1	2225	3¾x5	34x3½	34x4	W
Day–Elder, B	1½	2425	3¾x5	34x3½	34x5	W
Day–Elder, D	2	2900	4½x5¼	36x4*	36x7	W
Day–Elder, C	2½	3125	4¼x5	36x4	36x7*	W
Day–Elder, F	3½	3950	4½x5½	36x5*	36x5d*	W
Day–Elder, E	5	4875	4½x6	36x5	36x6d	W
Dearborn, F	1½	2180	3¾x5⅛	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5⅛	35x5†	34x7†	W
Defiance, G	1	1975	3¾x5	35x5†	35x5†	I
Defiance, D	1½	2550	3¾x5	35x5†	36x6†	I
Defiance, E	2	2750	3¾x5	35x5†	38x7†	I
DeKalb, E2½	2	2600	4⅛x5¼	36x4*	36x6*	W
DeKalb, E2	2½	2250	4⅛x5¼	34x3½*	36x5*	W
DeMartini 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4½x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 12	1	2200	3¾x5	35x5	36x6	I
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	I
Denby, 134	2	2800	3¾x5	36x3½	36x6	I
Denby, 25	3	3600	4½x5¼	36x4	36x7	I
Denby, 27	4	4600	4½x5½	36x5	36x5d	I
Denby, 210	5	5350	4½x5½	36x6	40x6d	I
Dependable, A	¾–1	1650	3½x5	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5½	31x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3550	4½x6	36x6	38x7	W
Diamond–T, O	1	2500	3¾x5¼	34x5†	36x6†	W
Diamond–T, FS	1½	2960	3¾x5¼	36x3½	36x5	W
Diamond–T, T	1½	2650	3¾x5¼	36x3½	36x5	W
Diamond–T, U	2	3285	4 x5¼	36x4	36x7	W
Diamond–T, K	3½	4675	4¼x5½	36x5	36x5d	W
Diamond–T, EL	5	5400	4½x5½	36x6	40x6d	W
Diamond–T, S	5	5650	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4¾x5¾	36x5	36x5d	C
Doane	6	6000††	4¾x6¾	36x6	40x6d	C
Dodge Brothers	½	1035††	3⅞x4½	33x4†	33x4†	B
Dorris, K–4	2	3400	4½x5½	36x4	36x7	W
Dorris, K–7	3½	4400	4¼x5½	36x5	36x10	W
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	2050	3¾x5½	36x5*	37x8*	W
Douglas I	3	3250	4¼x5½	36x6*	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	4250	4¼x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	I
Eagle, 100–2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facto, 1921	2½	2895	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Famous, B10	1	1800	3½x5	36x3½*	36x4*	I
Famous, B12	1½	2100	3¾x5	36x3½*	36x5*	I
Fargo, R	2	2500	3¾x5	36x4	36x6	I
Federal, SD	1	2500	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2725	4⅛x5¼	36x3½	36x5	W
Federal, UE	2	3025	4⅛x5¼	36x4	36x7	W
Federal, WE	3½	3950	4½x5½	36x5	36x5d	W
Federal, X2	5–6	5350	4¾x5	36x6	40x6d	W
Ford, TT	1	495	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4⅛x5¼	36x4	36x7	W
Forschler, BX	3	....	4⅛x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
Fulton, A	¾	1750	3½x5	35x5†	35x5†	B
Fulton, C	2	2350	3½x5	34x4	34x6	I
G & J**	2	3850	4x5¼	36x4	36x7	W
G & J**	3½	5175	4½x5½	36x5	36x5d	W
G.M.C., K15	¾	....	3½x5½	33x4½†	33x4½†	B
G.M.C., K16	1	....	3½x5½	34x5†	34x5†	B
G.M.C., K41	2	....	4 x5½	36x4*	36x7*	W
G.M.C., K71	3½	....	4½x6	36x5	40x5d	W
G M.C.,K101	5	....	4½x6	36x5	40x6d	W
G.W.W.	1½	2100	3¾x5½	35x5	35x5	I
Garford 15	¾	1590	3⅞x5⅛	34x5†	34x5†	W
Garford, 25	1¼	2090	3¾x5⅛	36x3½	36x4	W
Garford, 70–H	2	3190	4¼x5½	36x4	36x7	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 77D	3½	4390	4½x6	36x5	36x6d	W
Garford, 150–A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	$2550	4 x5½	36x3½	36x5	W
Gary, J	2½	3150	4¼x5½	36x4	36x7	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
Gersix M	1½	3100	4 x5½	36x3½	36x7	W
Gersix K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Giant, 15–A	1½	2200	3¾x5	34x3½	34x5	W
Giant, 16	2	3150	4⅛x5¼	36x4	36x7	W
Giant, 17	3½	4150	4½x5½	36x5	36x5d	W
Globe D–20	¾	1495	3⅜x5	33x4½†	33x4½†	B
Globe	1	1495	3⅜x5	33x5	33x5	B
Golden West, GH	3	5000	4½x6	36x7	36x7	W
Golden West, G	3½	4500	4½x5½	36x6	36x6	W
Golden West, H	3½–4	5000	4½x6	36x6	36x6	W
Golden West, T	4	5500	4¾x6	36x6	36x6	W
Golden West, K	7	6000	5½x6	36x6	36x6	W
Golden West, HA	7	6000	4½x6	36x6	36x10	W
Gove, A–1	2½	....	4¼x5¼	36x4*	36x7*	I
Graham Bros. A	1½	2495	3¾x5	35x5†	36x6†	I
Gramm–Bern., 10	1	1495§	3½x5	33x5†	33x5†	B
Gramm–Bern., 15	1½	2050§	3¾x5	36x3½*	36x5*	I
Gramm–Bern., 65	1½	2725§	3¾x5	36x3½*	30x5	W
Gramm–Bern., 20	2	3175§	4½x5½	36x4*	36x7*	W
Gramm–Bern., 25	2½	3575§	4¼x5½	36x4*	36x4d*	W
Gramm–Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm–Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4⅛x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10*	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal Fur, E	1	2350	4 x5	35x5†	35x5†	W
Hal Fur, B	2½	3250	4¼x5½	35x5*	38x7*	W
Hal Fur, F	3½	4250	4½x5½	36x6†	40x10†	W
Hall	1½	3100	3¾x5	34x5†	38x7†	W
Hall	2½	3275	4⅛x5¼	36x4	36x6	W
Hall	3½	4100	4½x5½	36x5	36x5d	W
Hall	5	5100	4½x5½	36x5	40x6d	W
Hall	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4⅛x5½	34x3½	34x5	W
Harvey, WFA	2½	3300	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	4300	4½x6	36x5	36x5d	W
Harvey, WKA	5	5200	4½x6	36x6	40x6d	W
Hawkeye, K	1½	2365	3¾x5¼	34x3½*	34x5*	I
Hawkeye, M	2	2915	4¼x5½	36x4*	36x6*	I
Hawkeye, N	3½	4345	4½x6	36x5*	36x10*	I
Hendrickson, N	2½	3150	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Hendrickson, K	5	4800	....	....	....	W
Highway, Knight A	4	....	4 x6	36x5	36x6d	W
Highway, Knight B	5	....	4 x6	36x5	40x6d	W
Higrade, A17	¾	1850	3½x5	32x4½	32x4½	W
Higrade, A18	1	2100	3½x5	35x5†	35x5†	W
Higrade, B20	1½	2500	4⅛x5¼	35x4†	36x6†	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt	1½	....	4 x5½	34x4	34x5	W
Hurlburt	2½	....	4¼x5½	36x4	36x4d	W
Hurlburt	3½	....	4½x6	36x5	36x5d	W
Hurlburt	5	....	4½x6	36x5	40x6d	W
Huron Erie	1½	2425	3¾x5¼	36x3½	36x5	I
Huron Mich.	2½	2950	4¼x5½	36x4	36x7	I
Indep'd't(Iowa),G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.),H.I.	2½	2940	4⅛x5¼	34x4	34x6	I
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep'd't(Ohio), F	1½	2585	3¾x5	36x3½	36x5	W
Indep'd't(Ohio) H	2½	3285	4⅛x5¼	36x4	36x4d	W
Indep'd't(Ohio) K	3½	4285	4½x5½	36x5	36x5d	W
Indiana, 12	1¼	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4⅛x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4⅛x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4½x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International S	¾	1500	3½x5	34x5†	34x5†	I
International 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5½	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4¼x5	36x4*	36x6*	I
International, 101	5	3600	4¼x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	4550	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	3¾x5¼	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4 x6	38x7†	44x10	I
K–Z, 1	1	2250	3½x5	34x3½	34x5	W
K–Z, 1½	1½	2750	3¾x5	36x4	36x6	W
K–Z, 2½	2½	3250	4⅛x5¼	36x4	36x8	W
K–Z, 3½	3½	4250	4½x5½	36x5	40x10	W
K–Z, 5	5	5200	4½x5½	36x6	40x6d	W
Kalamazoo, G–1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G–2	1½–2	3100	3¾x5	36x4*	36x5*	W
Kalamazoo, H	2½	3700	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4300	4¼x6	36x5	36x10	W
Karavan, A	2½	3900	4¼x6	36x4	36x8	W
Kearns, H	¾	1600	3¼x4½	32x4½†	32x4½†	I
Kearns, N	1½	2200	3½x5	34x3½	34x6	I
Kelly-Springfield K-31	1½	2900	3¾x5½	36x3½	36x6	C
Kelly-S., K–34	1½	2900	3¾x5½	36x3½	36x6	W
Kelly-S., K–36	2½	3250	3¾x5½	36x4	36x4d	W
Kelly-S., K–35	2½	3250	3¾x5½	36x4	36x4d	C
Kelly-S., K–40	3½	4200	4½x6½	36x5	40x5d	C
Kelly-S., K–41	3½	4200	4½x6½	36x5	40x5d	I
Kelly-S., K–42	3½	4200	4½x6½	36x5	40x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Kelly-S., K-45	4	$4550	4½x6½	36x5	40x6d	C
Kelly-S., K-50	5	4900	4½x6½	36x6	40x6d	C
Kelly-S, K-60	6	5100	4½x6½	36x6	40x7d	C
Keystone, 40	2	2450	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W
Kimball, AC	2½	3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W
Kimball, AF	5	5975	5 x6	36x6	40x7d	W
Kissel, Express	1	1985††	3½x5½	34x5†	34x5†	W
Kissel, Utility	1½	2775	3½x5½	36x3½	36x5	W
Kissel, Freighter	2½	3475	4¼x6½	36x4	36x7	W
Kissel, H. D.	4	4475	4¼x6½	36x5	36x5d	W
Kleiber, AA	1	2600	4½x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	3600	4½x5¼	36x4*	36x7*	W
Kleiber, B	2½	4200	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4900	4½x5½	36x5	36x5d	W
Kleiber, D	5	5600	5 x6½	36x6	40x12	W
Koehler, D	1½	....	3½x5	34x3½	34x5	W
Koehler, M	2½	....	4 x5½	36x4	36x7	W
Koehler, MCS	2½	....	4 x5½	36x4	36x7	W
Koehler, F	3½	....	4½x5½	36x5	36x10	W
Koehler, MT, Trac	5	....	4 x5½	36x4	36x7	W
L.M.C., 2-20	2½	2540	4½x5¼	36x4	36x4d	I
Lange, B	2½	3350	4¼x5¼	36x4*	36x6*	C
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, K	2½	3400	4½x5¼	36x4	36x7	W
Larrabee, L	3½	4200	4½x5½	36x5	36x5d	W
Larrabee, W	5	5100	4¾x6	36x6	40x6d	W
Lion, L	1	2350	3¾x5½	35x5†	35x5†	W
Luedinghaus, C	1	2100	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2700	3¾x5½	34x3½*	34x5*	W
Luedinghaus,	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2925	4¼x5¼	36x4	36x6	W
Maccar, H-2	2½	3750	4½x5½	36x4	36x4d	W
Maccar, M-2	3½	4500	4½x6	36x5	36x5d	W
Maccar, G	5	5500	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac., AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac., AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	4150	4 x5¼	36x4	36x7	W
Mapleleaf, BB**	3	4775	4½x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5770	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6825	4½x5½	36x6	40x6d	W
Master, JW	1½	2690	4½x5½	34x3½	34x5	W
Master, W	2½	3290	4¼x5½	34x4	36x7	W
Master, D	2½	3540	4¼x5½	34x4	36x7	D
Master, A	3½	4190	4½x6	36x5	40x5d	W
Master, E	3½	4610	4½x6	35x5	40x5d	D
Master, B	5	5290	4¾x6½	36x6	40x6d	W
Master, F	5	5440	4¾x6½	35x5	40x5d	D
Master Trac., T	6	3740	4¼x5½	36x7	36x4d	D
Maxwell, 1½	1½	1332	3¾x4¼	32x3	32x4	W
Menominee, HT	1	2080	3¾x5	34x3½	36x5	W
Menominee, H	1½	2725	4 x5	36x3½	36x5	W
Menominee, D	2	3245	4 x6	36x4	36x8	W
Menominee, G	3½	4270	4½x6	36x5	36x10	W
Menominee, J3	5	5450	4¾x6	36x6	40x12	W
Moline, 10	1½	2450	3½x5	34x5†	36x6†	I
Moreland, 20N	1	2850	3¾x5	35x5†	36x6†	I
Moreland, 21B	1½	2800	4½x5¼	36x3½	36x6	W
Moreland, 21C	2½	3500	4½x5½	36x4	36x8	W
Moreland, 21H	3½	4600	4¾x6	36x5	40x5d	W
Moreland, 21J	5	5000	4¾x6	36c6	40x6d	W
Mutual, 2B	2	3450	4 x6	36x4	36x8	W
Mutual, 2BP	2½	4150	4 x6	38x7†	42x9†	W
Napoleon, 7	¾-1	1350	3½x5	38x4	33x4†	I
Napoleon, XX-7	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1	1895	3¾x5¼	35x5	36x6	I
Nash, 3018	2	2550	3¾x5¼	36x6	40x8	I
Nash, Quad.	2	3250	4¼x5½	40x8	40x8	I
*Nelson, F1½	1½	....	4½x5¼	36x3½	36x5	W
*Nelson, F2	2	....	4½x5¼	36x4	36x7	W
*Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
*Nelson, FC5	5	....	4¾x6	36x6	40x6d	W
Netco, D	2	3100	4½x5¼	36x4*	36x7*	W
Netco, H	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2-2½	....	4½x5¼	36x4	36x4d	W
Niles, E	2	3000	4½x5¼	36x4*	36x7*	W
Noble, B30	1½	2585	3¾x5¼	36x3½	36x5	W
Noble, C40	2	2825	4 x5½	36x4	36x7	W
Noble, D50	2½	3150	4¼x5½	36x4	36x8	W
Noble, E70	3½	4030	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
Northwestern W	2	3300	4½x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1605	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	2025	3½x5	34x3½	34x3½d	W
Norwalk, 35E, Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	2675	4 x5½	36x3½†	36x5†	W
O. K., L1	2½	3450	4¼x5½	36x4	36x8	W
O. K., M1	3½	4250	4½x6	36x5	36x5d	W
Ogden, A1	1½	$2550	3¾x5	36x3½	36x5	W
Ogden, E	2½	3250	4½x5¼	36x4	36x7	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
Old Reliable, KLM	7	6000	4¾x6½	36x6	40x7d	C
Oldsmobile Econ.	1	1500	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oneida, A-9	1¼	2350	3¾x5½	36x3½	36x5	W
Oneida, B-9	1¾	2915	4 x5¼	36x4	36x7	W
Oneida, C-9	2½	3390	4 x5¼	36x4	36x7	W
Oneida, D-9	3½	4345	4½x5½	36x5	36x10	W
Oneida, E-9	5	5460	4½x5½	36x6	40x12	W
Orleans, A	1½	2750	3¾x5⅛	36x3½	36x5	W
Orleans, B	2½	3250	4x5½	36x4*	36x7*	W
Orleans, C	3½	3750	4½x5½	36x4½	36x8	W
Orleans, D	5	4250	4½x5½	36x6	40x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5½	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5½	38x7†	38x7†	4
Packard, EC	....	3500	4¾x5½	36x4	36x7	W
Packard, ED	....	4100	4½x5½	36x5	36x5d	W
Packard, EF	....	4500	5 x5½	36x6†	40x6d†	W
Packard, EX	....	4000	4¾x5½	36x6†	40x8†	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x6	W
Paige, 54-20	2½	3400	4¼x5½	34x4	34x4d	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	¾	1785	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	1½	2450	4 x5¼	34x3½*	34x5*	W
Patriot, Washgt'n	2½	3450	4½x5½	36x4*	36x7*	W
Piedmont, 4-30	1½	1685	3½x5	34x4†	34x4†	W
Pierce-Arrow,	2	3750	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4950	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	5700	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4¼	32x4½†	32x4½†	W
Pittsburger, B 21	2½-3	3800	4½x5¼	36x5*	36x7*	W
Pony	¼	400	2¾x4	28x3†	28x3†	C
Power, F	1½	....	3¾x5¼	36x6	36x6	W
Power, C	3½	....	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-11	¾	2159	3½x5	35x5†	35x5†	W
Rainier, R-15	3½	4503	4½x5½	36x5	36x5d	W
Rainier, R-19	1	2350	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2600	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2950	4¼x5¼	34x4	34x6	W
Rainier, R20	2½	3000	4½x5¼	34x4	34x7	W
Rainier, R17	5	5250	4½x6	36x6	36x6d	W
Ranger, TK-20-2	2	....	3¾x5	36x6†	36x6†	W
Ree, F	¾-1½	1385	4¾x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2500	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3200	4¼x5½	36x4	36x4d	I
Republic, 75	¾	1395††	3½x5	33x4½	33x4½	I
Republic, 10	1	1695	3¾x5	35x5†	35x5†	I
Republic, 10Exp.†	1	2095	....	35x5†	35x5†	I
Republic, 11X	1½	2295	3¾x5	34x3½	34x5	I
Republic, 19	2½	2795	4½x5¼	36x4	36x7	I
Republic, 20	3½	3845	4½x5½	36x5	36x10	I
Riker, B	3	4600	4¼x6	36x5	36x5d	W
Riker, BB	4	4800	4¼x6	36x5	36x6d	W
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5†	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Rumely, A	1½	2720	3¾x5¼	36x3½	36x5	W
Samsen, KO 15	¾	....	3½x4	32x4	32x4	B
Samsen, E 25	1¼	....	3½x5½	35x5	35x5	B
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3550	4¼x5½	36x4	36x7	W
Schacht, 2½-Ton	2½	3850	4¼x5½	36x4	36x4d	W
Schacht, 3½-Ton	3½	4350	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	5350	4½x6	36x5	40x6d	W
Schwartz, A	1	1685	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Selden, 2½A	2½	3425	4½x5¼	36x4	36x7	W
Selden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M	½	1020	3½x4½	30x3½†	30x3½†	B
Service, 15	¾-1	1840	3¾x5	34x4½	35x5	B
Service, 220	1	2415	3½x5½	34x3½	34x5	W
Service, 31	1½	2985	4 x5½	36x3½	36x6	W
Service, 36	1½	3415	4¼x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	$4285	4¼x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 101	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	2475	4¾x5	34x5†	36x6†	W
Signal, H	1½	2925	4½x5¼	34x4	36x6	W
Signal, J	2½	3275	4½x5¼	34x4	36x8	W
Signal, M	3½	4275	4½x5½	36x5	40x5d	W
Signal, R	5	5300	4¾x6	36x6	40x6d	W
Southern, 10	1	2.90	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¼x5¼	36x6†	40x8*	W
Standard, 1-K	1-1½	1950	3¾x5	34x3½*	34x5*	W
Standard, 76	2½-3	3100	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	4000	4½x5½	36x5	36x10	W
Standard, 5-K	5-6	5250	4¾x6	36x6	40x12	W
Sterling, 1½	1½	3200	4 x5¼	36x3½	36x5*	W
Sterling, 2	2	3500	4 x5¼	36x4	36x6	W
Sterling, 2½	2½	3650	4¾x5¼	36x4*	36x4d*	W
Sterling, 3½	3½	4650	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	5500	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	6000	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6500	5 x6¼	36x6	40x7d	C
Stewart, 11	¾	1350	3½x4½	32x4†	32x4†	I
Stewart, 15	1	1875	3½x5	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4½x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5½	36x4	36x7	W
Stoughton F	3	3600	4¼x5½	36x5.1	36x5d	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4½x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
Tiffin, GW	1½	2695	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	3580	4½x5¼	36x4	36x3½d	W
Tiffin, PW	3½	4760	4½x5½	36x5	40x5d	W
Tiffin, F50	5	5850	4¾x6	36x6	40x6d	W
Tiffin, F60	6	6050	4¾x6	36x6	40x12	W
Titan, HT	3½	4550	4½x6	34x4*	40x5d	I
Titan, HD	5	5400	4½x6	36x5	40x6d	I
Titan, TS	2½	3400	4¼x5½	34x4*	36x4d	I
Tower, J	1½	3000	4¼x5¼	35x5	38x7	W
Tower, H	2½	3475	4½x5¼	36x4	36x7	W
Tower, G	3½	4400	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½*	34x5*	I
Transport, 20	1	1850	3¾x5½	34x3½	34x4	I
Transport, 30	1½	2250	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	4195	4½x6	36x5	36x10	I
Traylor, B	1½	2500	3¾x5½	34x3½	34x5	W
Traylor, C	2	3000	4 x5½	36x4	36x7	W
Traylor, D	3	3500	4¼x5½	36x4	36x8*	W
Traylor, E	4	4700	4½x6	36x5	40x10	W
Traylor, F	5	5100	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1600	3¼x5	35x5†	35x5†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1095	3½x5½	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	3000	4 x5½	36x4	36x7	I
Twin City, A. W.	3½	4400	4½x6	36x5	40x5d	W
Twin City, FWDB	3½	4750	5½x6	36x6	36x6	I
Twin City, FWDA	5	5250	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½	36x6*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, F W	2½	3190	4 x6	36x5*	36x8*	D
Union, H W	4	4185	4½x6	36x6	40x12	D
Union, J W	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5½	6x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5000	4½x6	36x6	40x6d	I
U. S., N	1½	2475	3¾x5	36x3½*	36x5*	I
U. S., R	3	3795	4 x5½	36x4	36x4d	W
U. S., S	4	4595	4½x5½	36x5	36x5d	W
U. S., T	6	5850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	2200	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5¼	35x5†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4½x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4¼x6	36x5	36x5d	W
Victor, A	1½	2050	3¾x5	34x4	34x5	I
Vim, 29	½	1355	3½x4½	31x4†	31x4†	W
Vim, 30	½	1550	3½x4½	32x4½	32x4½	W
Vim, 31	1	2475	3¾x5⅛	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker-Johnson, B	2½	3500	4¼x5½	36x4	36x8	W
Walter, S	5	5600	4½x6¼	36x6	40x6d	D
Waltham, E	1½	2350	3¾x5¼	36x6†	38x7†	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W
Ward-LaF., 4A	3½	4690	4½x6¼	36x5	36x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. ‡—Price includes several items of equipment.

*Nelson Le Moon

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Ward-LaF., 5A	5	$5590	5 x6¼	36x6	36x6d	W
Sanson, E	1	1865	3¾x5¼	34x4½†	34x4½†	W
Watson, N	3½	4250	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4½x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4½x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5½	34x5†	34x5†	B
White, 20	2	3250	3¾x5½	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	2450	3¾x5	34x5†	34x5†	W
White Hick., H	1½	2750	3¾x5	36x3½	36x5	W
White Hick., K	2½	3350	4½x5¼	36x4	36x5	W
Wichita, K	1	2300	3¾x5¼	36x3*	36x4*	W
Wichita, L	1½	2600	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5¼	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	$4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	2100	3¾x5½	36x4*	36x4*	W
Wilcox, B	1½	2775	4¼x5	36x4	36x5	W
Wilcox, D	2½	3300	4¼x5	36x4*	36x3½†*	W
Wilcox, E	3½	4250	4½x6	36x5*	36x5d*	W
Wilcox, F	5	5200	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¾x5	36x3½	36x5	W
Wilson, EA	2½	2825	4½x5¼	36x4	36x7	W
Wilson, G	3½	3685	4½x5½	36x5	36x5d	W
Wilson, H	5	4520	4¾x6	36x6	40x6d	W
Winther, 751	¾	1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	$2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 450	4	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Wisconsin B	1	1950	4 x5¾	34x5†	34x5†	W
Wisconsin C	1½	2250	4¾x5¾	34x5†	36x6†	W
Wisconsin D	2½	3500	4½x6¼	36x6	36x10	W
Wisconsin E	3½	4000	5 x6¼	36x6†	36x12†	W
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4¼x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3125	4¼x5¼	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I
Yellow Cab M21	¾	2050	3¾x5	32x4	32x4	B
Yellow Cab M41	1¼	2350	3¾x5	34x4½	34x4½	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	16-30	$1975	3	Clim.	4-5 x6½	GDK	3-4
Allis-Chalm..B	6-12	925	2	LeR.	4-3⅛x4½	Gas.	1
Allis-Chal.G.P	6-12	850	2	LeR.	4-3⅛x4½	Gas.	1-2
Allis-Chalm.	12-20	1495	2	Mid.W	4 4⅛x5¼	Gas.	2-3
Allis-Chalm.	18-30	2150	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm	10-18	875	4	Own	4-4¾x6½	G,K	4
Allwork...2-G	14-28	....	4	Own	4-4¾x6	GorK	3
Allwork...C	14-28	....	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
Aro.....1921	3-5	550	4	Own	1-4½x5	Gas.	1
Aultman-T.	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T.	22-45	3850	4	Own	4-5½x8	G,K	6
Aultman-T.	30-60	5000	4	Own	4-7 x9	G,K,D	8
Automot. B-3	12-24	1785	4	Herc.	4-4 x5½	Gas.	2-3
Avery.SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery...B	5-10	....	4	Own	4-3 x4	G,K	2
Avery.....C	....	....	4	Own	6-3 x4	G,K	..
Avery	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery	12-20	....	4	Own	4-4⅜x6	G,K,D	2-3
Avery	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery	14-28	....	4	Own	4-4⅞x7	G,K,D	3-4
Avery	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery	25-50	....	4	Own	4-6½x7	G,H,D	5-6
Avery	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule..H	15-25	....	4	Midw	4-4½x5¼	Gas.	3
Bates Mule..F	18-25	....	*2	Midw	4-4½x5¼	Gas.	3
Bates Mule G	25-35	....	*2	Midw	4 4½x6	Gas.	com.
Bean	8-16	....	*1	Own	4-3⅞x4	G,K	2-3
Beeman....G	2-4	315	4	Own	1-3½x4½	Gas.	½
Best	30	....	*2	Own	4-4¾x6½	G,K,D	4
Best	60	....	*2	Own	4-6½x8½	G,K,D	8-9
Boring...1921	....	1850	3	Wauk	4-4⅜x5¾	GorK	2
Burn-Oil.1921	15-30	1650	4	Own	2-6¾x7	Ker.	3-4
Capital	15-30	1000	2	Own	4-4⅜x6	Gas.	3
Case	10-18	1090	4	Own	4-3⅞x5	GorK	2
Case	15-27	1680	4	Own	4-4½x6	GorK	3
Case	22-40	3100	4	Own	4-5½x6¾	GorK	4-5
Caterpillar T11	25	....	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	....	*2	Own	4-6½x7	Gas.	6
Centaur	5-2½	455	2	N Way	2-4½x4½	G or K	1-9
Chase	12-25	2100	3	Buda	4-4¼x5½	GorK	2-3
Chicago	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac.....W	12-20	1495	*2	Own	4-4 x5½	G,K,D	3-4
Dakota.....4	15-27	1750	3	Dom.	4-4¾x6	Gas.	3
Dart.....B.J.	15-30	2100	4	Buda	4-4½x6	Gas.	3-4
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill.....D	20	2480	4	Cont.	4-4½x5½	Gas.	3
Dill.....R.W.	20	2980	4	Midw	4-4½x6	Gas	3
Do-It-All	-7	595	..	Own	1-4½x5	Gas.	..
Eagle.....F	12-22	1390	4	Own	2-7 x8	GorK	3-4
Eagle.....F	16-30	1850	4	Own	2-8 x8	GorK	4-5
E-B.....AA	12-20	1545	4	Own	4-4¾x5	GorK	3
E-B.....Q	12-20	1000	4	Own	4-4¾x5	GorK	3
E-B	16-32	2000	4	Own	4-5¼x7	GorK	4
Evans	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol.....D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse..B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch.....4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City	40-70	....	4	Own	4-7½x9	Ker.	8-10
Fordson	.. 20	625	4	Own	4-4x5	G,K	2
Fox.....E	20-40	3100	4	Own	4-5½x7½	G or K	4
Franklin....G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin....C	18-20	33.0	*2	Clim	4 5x6½	G or K	3-4
Franklin...G 2	18 30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick.....A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick.....C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
G-O.....G	14-28	1485	4	Wauk.	4-4½x5¼	GorK	3
Grain Belt...A	18-36	2 5[illegible]	4	Wauk.	4-4¾x6¼	GorK	4
Gray.....1920	18-36	$2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog	19-31	2000	4	Erd.	4-4 x6	GorK	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K.	4
Hart-Parr..20	20	995	4	Own	2-5¼x6½	K.D	3
Hart-Parr..30	30	1595	4	Own	2-6½x7	K,D	3
Heider.....D	9-16	1170	4	Wauk	4-4¼x5¾	G,K	2
Heider.....C	12-20	1395	4	Wauk	4-4½x6¾	G,K	3
Heider...Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	1
Hicks	20-30	....	4	....	4-4½x6	KorG	4
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	GorK	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas.	3
Illinois, Super Drive.....C	18-36	2500	4	Clim.	4-5 x6½	G,K	4
Imperial.....E	40-70	5000	4	Own	4-7½x9	G,K,D	10
Indiana.....F	5-10	....	2	LeR.	4-3⅛x4½	Gas.	1-2
International.	8-16	1000	4	Own	4-4¼x5	G,K,D	2
International.	15-30	1950	4	Own	-5¼x8	G,K,D	4
J-T.....N	20-40	3485	*2	Chief	4-4¾x6	G,K,D	3-4
Klumb.....F	16-32	1650	4	Clim.	4-5 x6½	....	..
LaCrosse...M	6-12	900	4	Own	2-4 x6	G,K	1
LaCrosse...G	12-24	1250	4	Own	2-6 x7	GorK	3
Lauson	12-25	1495	4	Midw.	4-4⅛x5¼	Gas.	3
Lauson	15-25	1685	4	Beav.	4-4½x6	GorK	3-4
Lauson.....21	15-30	1985	4	Beav.	4-4¾x6	GorK	3-4
Leader.....B	12-18	1095	4	Own	2-6 x6¼	G,K,D	2-3
Leader.....N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader.....GU	18-35	2775	*2	Clim.	4-5x6½	G,K	3-4
Leonard....E	20-30	2530	4	Buda	4-4½x6	G,K	3
Liberty....A	18-32	2475	4	Clim.	4-5 x6½	G,K	4
Linn.....H4J	40-	4500	*	Cont.	4-4½-5½	Gas	4
Linn.....W	60	5100	*	Wauk.	4-5 x6¼	Gas.	6
Little Giant..B	16-22	2200	4	Own	4-4½x5	K.	4
Little Giant..A	26-35	3300	4	Own	4-5½x6	K.	6
Lombard.....	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard.....	50	....	*2	....	4-4¾x6½	....	6-10
Magnet.....B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr.....	5-10	585	..	LeR.	-2¾x4	Gas.	1
MerryGar1921	2	230	2	Evin	1-2¾x2½	Gas.	..
Minne...All-P	12-25	1200	4	Own	4-4½x7	GorK	3
Minne. Gen.P.	17-30	1850	4	Own	4-4¾x7	GorK	3-4
Minne. Med.Duty	22-44	3300	4	Own	4-6x7	GorK	5-6
Minne. HeavyDuty	35-70	4600	4	Own	4-7½x9	GorK	8-9
Mohawk.1921	8-16	785	4	Light	4-3½x4½	KorG	1-2
Moline Univ D	9-18	1075	2	Own	4-3½x5	Gas.	2-
Moline Orch..	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Motor Macult.	1½	195	2	Own	1-2¾x3½	Gas.	..
Motor.....	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB.....1	3-6	425	4	Own	2-3¼x4	Gas.	¾
NB.....2	3-6	425	4	Own	2-2¾x4	Gas.	¾
Nichols-Shep.	20-42	3100	4	Own	8 x10	GorK	3-6
Nichols Shep.	25-50	3460	4	Own	9 x12	GorK	4-7
Nilson Jr.....E	13-25	1775	4	Wauk	4-4¼x5¾	G or K	3
Nilson Senior	20-40	2475	5	Wauk	4-5 x6¼	G,K	4
Oil Pull.....K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull.....H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull.....G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull.....E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-5½x5½	Gas.	2½
Oliver.....A	15-30	....	*2	Beav.	4-4½x6	GorK	3-4
Once Over Tiller Mark..6	12-25	3000	4	Strns	4-4½x6	Gas.	2-
Parrett.....K	15-20	1950	4	Pitt	4-4½x6	G,K	3
Peoria.....L	12-25	1785	4	Clim.	4-5 x6½	G,K	3
Pioneer.....G	18-36	[illegible]	4	Own	4-5½x6	G,K,D	4
Pioneer.....C	30-60	4000	4	Own	4-7 x8	Gas.	10
Planet Jr.....	5-10	950	2	LeRoi	4-3½x4½	Gas	1
Plowman.....A	15-30	1995	4	Buda	4-4½x6	G,K	3-4
Port Huron.....M	12-25	3100	4	Chief	4-4¾x6	G,K	3
Post.....D	12-20	$1800	4	Wauk	4-4¼x5¾	GorK	2
Prairie Dog..L	9-18	650	3	Wauk	4-3¾x5½	Gas.	2
Prairie Dog..D	15-30	1250	4	Wauk	4-4½x6¼	Gas.	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed.....	15-30	2250	4	Dom	4-4¾x6	K.	3-4
Reed.....A-1	18-36	2400	4	Dom	4-5 x6	Gas.	4
Reliable.....	10-20	985	4	Own	2-6 x7	Ker.	2
Rex.....	12-25	1600	4	Wauk	4-4¼x5¾	GorK	3
Russell.....	12-24	1500	4	Own	4-4½x5¾	GorK	2-3
Russell.....	15-30	2200	4	Own	4-5 x6½	GorK	3-4
Russell.....	20-35	3000	4	Own	4-5½x7	GorK	4-5
Russell.....	30-60	5000	4	Own	4-8 x10	GorK	8-10
Samson....M	.....	995	4	Nov.	4-4 x5½	G,K	2
Sandusky....J	10-20	1250	4	Own	4-4¼x5½	G,K,D	2
Sandusky....E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com.	6-12	....	2	LeR.	4-3½x4½	Gas.	10
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby.....D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby.....C	10-20	....	4	Erd.	4-4 x6	GorK	2-3
Short Turn....	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Square T....A	18-35	2075	3	Clim.	4-5 x6½	K,G	3
Steady Pull....	12-24	1485	4	....	4-4 x5	Gas.	3
Stinson....4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone.....	20-40	....	4	Beav.	4-4¾x6	G,K	4
Tioga.....3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan.....	10-20	1000	4	Own	2-6½x8	G,K,D	3
Topp.....B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR.	4-3½x4½	Gas.	2
Townsend....	10-20	1200	2	Own	4-6½x7	Ker	2-3
Townsend	15-30	1800	2	Own	4-7 x8	Ker	3-4
Townsend....	25-50	3000	2	Own	4-8½x10	Ker	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor....TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1
Triumph....H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar...10	25-40	3750	*2	Wauk	4-5 x6½	G or K	4
Turner...1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City.....	12-20	....	4	Own	4-4¼x6	G,K	3
Twin City.....	20-35	....	4	Own	4-5½x6¾	G,K	5
Twin City.....	40-65	....	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal.....	1-4	475	2	Own	1-3½x5	G	1
Utilitor....501	2¼-4	380	4	Own	1-3½x4½	G	5-6
Velie..Biltwell	12-24	1750	4	Own	4-4¼x5½	G,K,D	3
Victory...1921	9-18	1350	4	Gray.	4-3½x5	Gas.	2
Victory...1921	15-30	1750	4	Wauk	4-4¼x5¾	Gas.	3
Vim.....B	15-30	1650	4	Wauk	4-4¾x5¾	G,K	3
Wallis.....K	15-25	1600	4	Own	4-4¼x5¾	G,K	3
Waterloo....N	12-25	....	4	Own	2-6½x7	G,K	3
Webfoot....40	25-40	4000	..	....	....	....	..
Webfoot....53	28-53	5250	*2	Wisc.	4-5¾x7	G,D	6
Wellington..B	12-22	900	4	Erd.	4-4 x6	Ker.	2-3
Wellington..F	16-30	1400	4	Chief	4-4¾x6	Ker.	3-4
Western. 1920	16-32	2100	4	Clim.	4-5x6½	Gas.	4
Wetmore.....	12-25	1650	4	Wauk	4-4 x5¾	G,K	3
Wharton....E	12-20	1800	3	Buda	4-4¼x5½	Gas.	2
Whitney.....	9-18	1175	4	Own	2-5½x6½	Gas.	2
Wichita.....T	15-30	2500	4	Beav	4-4½x6	G,K,D	3-4
Wisconsin...E	16-30	2250	4	Clim.	4-5 x6½	Ker.	4
Wisconsin...H	22-40	3200	4	Clim	4-5½x7	Ker.	5
Yuba...15-25	15-25	2945	*2	Wisc.	4-4¼x6	G,K,D	..
Yuba...25-40	25-40	4892	*2	Wisc	4-5¾x7	G,K,D	..
Zelle.....	12-25	....	4	....	4-4½x5½	G or K	3

ABBREVIATIONS: G—Gasoline, K—Kerosene, D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make; Beav.—Beaver, Clim.—Climax, Cont.—Continental, Dom.—Domas, Evin.—Evinrude, Herc.—Hercules, LeR.—LeRoi, Midw.—Midwest, Nway.—New Way, Nor.—Northway, Strns.—Stearns, T.C.—Twin City, Wauk.—Waukesha, Weid.—Weidely, Wis.—Wisconsin, *—Crawler type. All others are wheel type.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Indianapolis	Automobile and Accessory Show	Sept. 6-10
Cincinnati	Fall Automobile Show	Oct. 1-8
Olympia, Eng.	Automobile Show	Nov. 3-12
Chicago	Automotive Equipment Show	Nov. 14-19
New York	Automobile Salon	Nov. 27-Dec. 3
Chicago	Automobile Salon	January, 1922
New York	National Automobile Show	Jan. 7-13, 1922
Chicago	National Automobile Show	Jan. 28-Feb. 3, 1922

RACES

Detroit, Mich.	Pikes Association Tour, Michigan and Ontario	July 9-24
Le Mans	French Grand Prix	July 25
Cotati, Calif.	Opening of New Speedway	August 14
Pikes Peak	Hill Climb	September 5
Uniontown Speedway	Annual Autumn Classic	September 5
Los Angeles	Speedway Race	November 24

FOREIGN SHOWS

Buenos Aires, Argentina	Passenger Cars and Equipment	September
Luxemburg	Luxemburg Agricultural Sample Exhibition	September
Paris, France	Paris Motor Show	October 5-16
London	British Motor Show, Society Motor Mfgs. and Traders	Nov. 4-12

CONVENTIONS

Greenville, S. C.	South Carolina Automotive Trade Association	July 20
Coden, Ala.	Midsummer Meeting of Alabama Automobile Dealers' Ass'n	July 25-26
Chicago	Twenty-eight Annual Convention National Implement & Vehicle Asssociation	Oct. 12-24
Cleveland	National Tire Dealers' Association	November

Business Notes

Franklin Automobile Co. sales organization throughout the United States gave over the week of July 1 in honoring John Wilkinson, vice-president and consulting engineer of the company, who 20 years ago began work on the Franklin air-cooled automobile.

Westcott Motor Car Co. and the H. G. Root Co., automobile supplies, have authorized the payment of the regular quarterly dividend of 2% on the preferred stock payable June 30. H. G. Root, president of the Root Co. and general manager and treasurer of the Westcott company states that June business has been surprisingly good and much better than had been expected.

The International India Rubber Corp., of South Bend, Ind., has changed its name to Odell Rubber Co.

Kelsey Wheel Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock payable Aug. 1 to stock July 21.

Sorg Motor Car & Truck Co. has leased the entire building at Woodward avenue and Alexandrine as a salesroom for display of Locomobiles, Mercer and Templar cars. The new salesroom is 60 by 75 feet and the same amount of space in the rear is devoted to the service station.

Tulsa Automobile Manufacturing Co. has been sold to D. M. Witt of Oklahoma City by R. M. McFarlin and his associates. The company has dealers in California, Oregon, Washington, Missouri, Colorado, Arkansas and Oklahoma.

The Kelsey Motor Co. of Newark, N. J., manufacturer of the friction transmission Kelsey Six, opened a New York salesroom July 1.

Kant-Skore Piston Co., of Buffalo, and North Tonawanda, N. Y., has purchased the plant of the D. T. Williams Valve Co., at Cincinnati, and is moving the entire factory equipment and general offices to that city. The new plant will permit greatly increased production.

H. H. Franklin Manufacturing Co., makers of the Franklin car, has declared a common stock dividend of 50 cents a share, payable July 11 to all stock holders of record June 30. Profits for the first five months of 1921 are estimated to be in excess of $775,000 after taxes.

LIGHT LAW FOR MASSACHUSETTS

Boston, July 11—About August 1 Massachusetts will observe a new headlight law that will do much to straighten out the tangle existing since the law was first enacted. There will be about 20 different light lenses and devices approved by Motor Vehicle Commissioner Frank A. Goodwin. Some time ago he sent out specifications drawn up by his experts on lighting to makers of devices, and requested that samples be sent to him for tests.

Under the new law every car will have to use 21 candle power bulbs. All over or under that limit will be outlawed. Tilting reflector devices are barred under the new law which fact may lead to trouble as one maker says he will test the ruling in court.

CHEVROLET HEAT-TESTS CARS

Indianapolis, Ind., July 8—Following the speedway races here last Memorial Day in which a car designed by Louis Chevrolet won, making the second consecutive time a Chevrolet car has won here, it has become known that both cars were given a special heat treatment before the race. The treatment was applied to connecting parts.

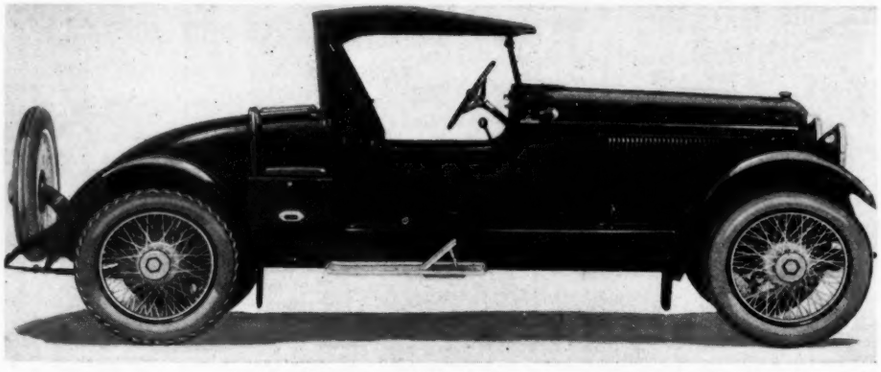
Following the race in 1920, Mr. Chevrolet did not mention this treatment, but when a car designed by him won again this year, something never before accomplished on the local track, he made public the fact that the special treatments had been applied.

BUYS EIGHT TIRE STORES

Seattle, July 8—The Western Auto Supply Co., operating a large chain of automobile tire and accessory stores in the western half of the United States, and capitalized at $3,000,000 has just completed negotiations for the purchase of the eight large stores owned and operated by the Autoparts Supply Co., a half million dollar corporation, operating in Seattle, Portland, Tacoma, Spokane, Yakima, Walla Walla and Boise.

For the present the stores of the Autoparts Supply Co. will be operated as a subsidiary company, and there will be no radical change in management or personnel.

New Paige "6-66" Daytona Unites Speed and Comfort



Uniting the power and speed of the racing car with comfort and utility, this model has a wide deeply upholstered driving seat and an extra upholstered sliding seat with an arm rest, made available by the pulling out of a door, a commodious waterproof electric lighted locker under the turtle deck, a short aluminum runningboard with foot plate for extra seat, a demountable top that can be lifted free of the body by removing two screws and a dozen thumb fasteners, side lamps, electric clock, cigar lighter and muffler cutout. The body is finished in deep red and the upholstering is of high grade blue leather with a hand-crushed finish